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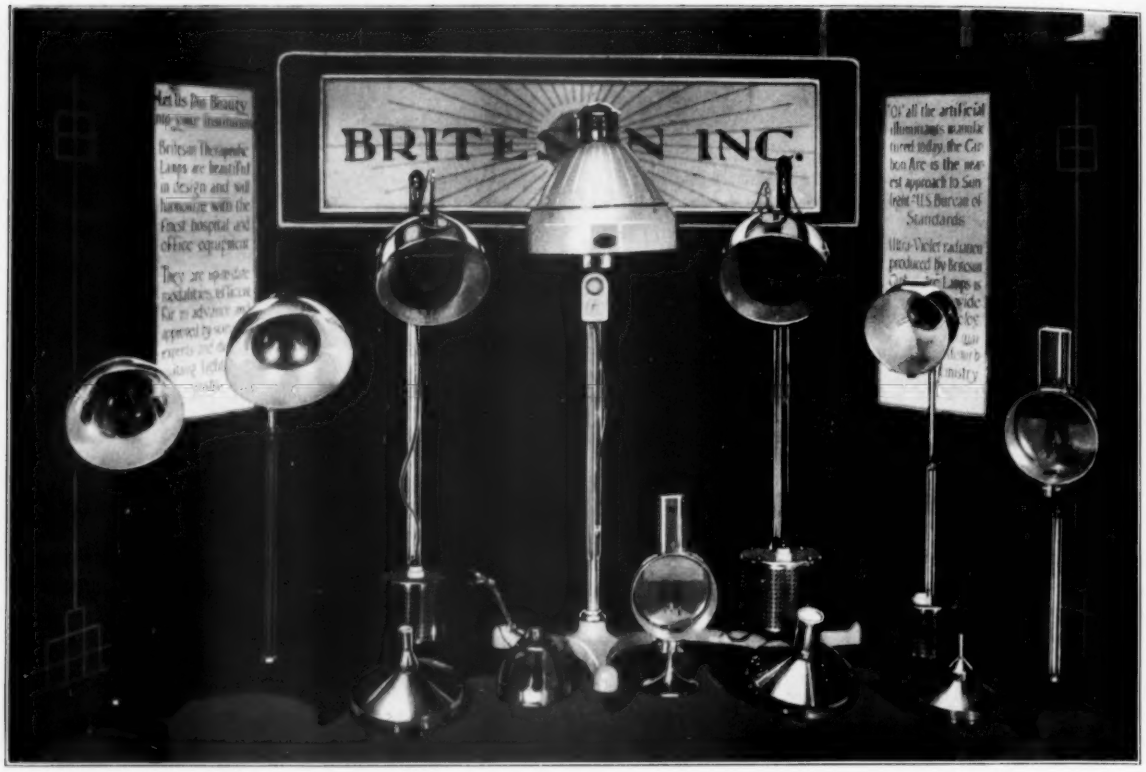

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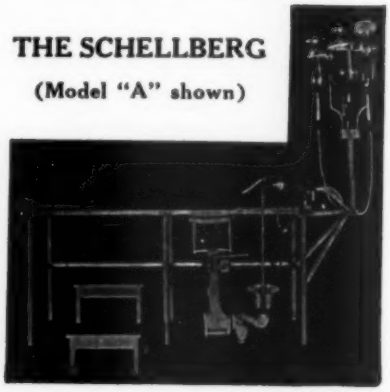

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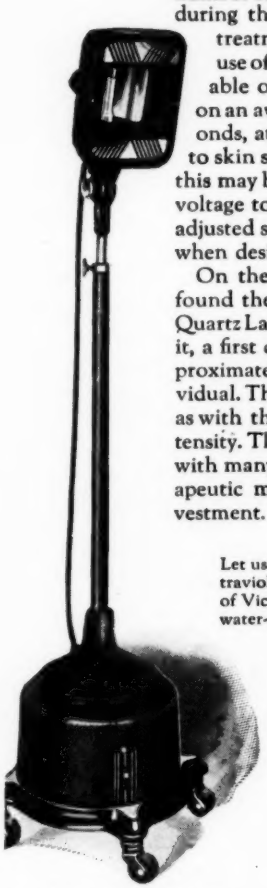

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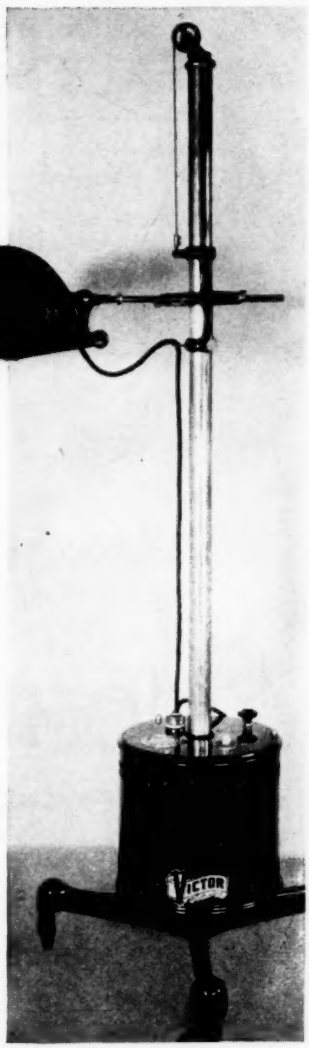

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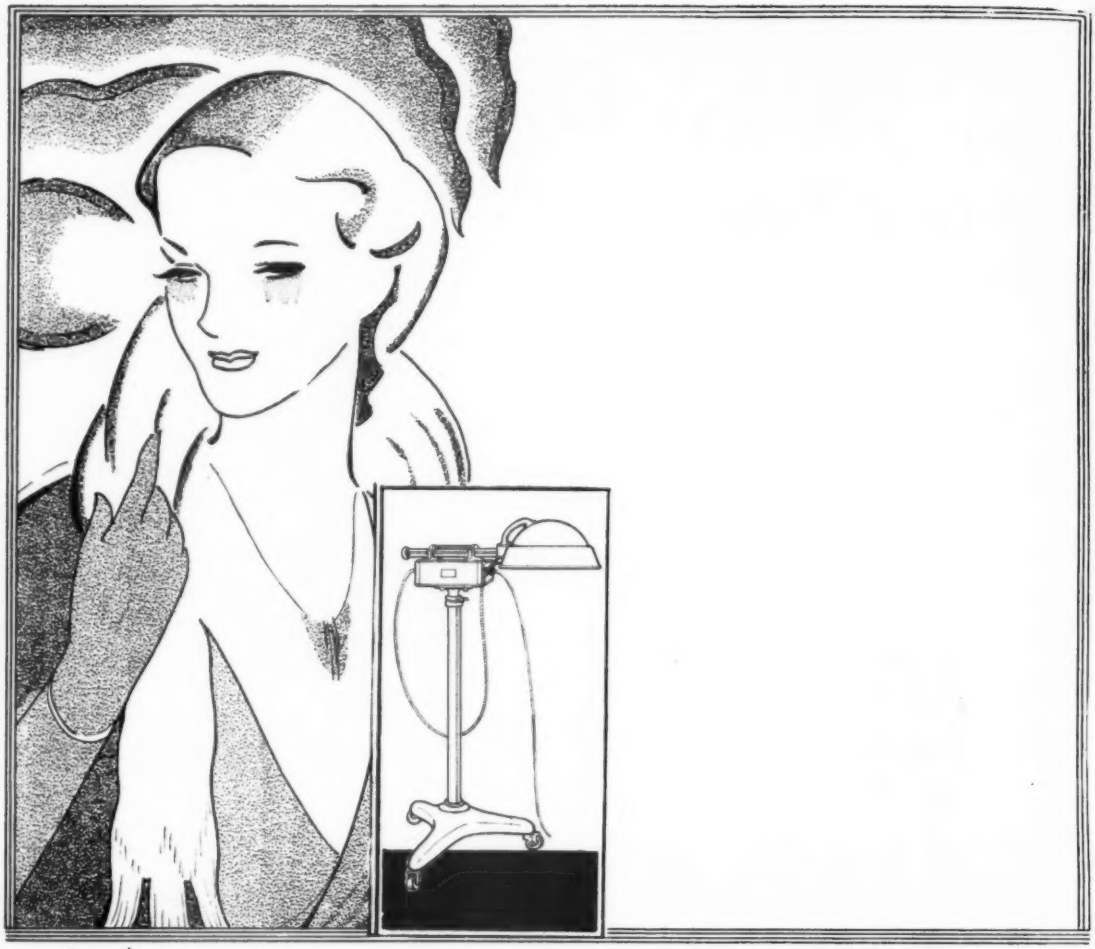

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THE USE OF WATER IN THERAPEUTICS *

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PHILADELPHIA

The subject, "The Use of Water in Therapeutics," is so vast that it is impossible to discuss all of the many phases in a limited paper. It will be necessary, therefore, to touch only briefly on certain aspects and to confine myself, in some instances, to the merest indications of the description of its technic.

Physiological Effects of Water

Cold or warm water when brought in contact with the skin produces a stimulation of the cold and heat receptors respectively, which affect remote tissues reflexly, resulting in various functional changes in the latter. The greater the difference in temperature between the water and the skin the more intense is the thermic stimulation. The temperature of the skin varies somewhat in different parts of the body, the mean temperature in healthy individuals being approximately 93 degrees F. Water at this neutral temperature is felt neither as cold nor as heat and produces, if any, only slight functional changes, if the application is of brief duration. The neutral point is naturally higher in febrile conditions than in a normal state of health. Water at a very high temperature, i. e., at, or near, the point of tolerance, has practically the same effect as cold water. Hence the error of prescribing hot water baths "as hot as you can bear it," when a sedative effect is desired, is quite apparent. The effect of water is influenced considerably by simultaneous mechanical stimulation as by the projective force of water in showers, douches, sea bathing, or by frictions. Certain other factors also influence the effect of water. For example, the more suddenly the water is applied, the larger the area with which it comes in contact and the better the blood supply of the skin, the more powerful is the stimulation.

Effect on body temperature and metabolism — Because of the thermostatic function of the heat center, the body temperature is affected only slightly by external temperature changes.

Metabolism is increased by cold water procedures. Heat applications also increase the metabolism, provided they are intense enough to raise the body temperature.

Effect on Circulation — When cold water is applied to the body surface the cutaneous blood vessels of the part treated become reflexly constricted. The blood thus pressed out from the peripheral vessels is accommodated by the deeper tissues, probably mostly by the skeletal muscles.

If the duration of the application is short, the constricted blood vessels, while still maintaining their tone, again dilate immediately, or very soon after the removal of the application, and are refilled, in excess of the normal supply, with arterial blood from the deeper tissues. The result is a tonic peripheral hyperemia with increased velocity of the blood current. This reactive hyperemia with its effect on all the vital functions of the body is called, in Hydrotherapy, "Reaction." The securing of reaction is a matter of the greatest importance, because it is a criterion by which we are enabled to measure the patient's tolerance of the application and to judge whether or not the desired therapeutic result can be expected. Objectively a *good* reaction is manifested by a bright pink hue of the skin and by the skin feeling warm to the touch. Subjectively a good reaction is experienced by a feeling of warmth, comfort and enhanced vigor. A *poor* reaction is recognized objectively, by a pale or cyanotic color of the skin, and subjectively, by chilliness, shivering and a feeling of discomfort and lack of vital energy.

When the cold water application is of short duration, the *tone* of the cutaneous vessels is maintained during their refilling, because their muscular elements are not then exposed to the effect of cold sufficiently

* Read before the New York Physical Therapy Society, April 22, 1931. An abstract from the author's chapter on Hydrotherapy in the forthcoming work, "The Principles and Practice of Physical Therapy," Chapter 20, Volume III, edited by Harry E. Mock, M.D., John S. Coulter, M.D. and Ralph Pemberton, M.D., published by W. F. Prior Company, Inc., Hagerstown, Maryland, and used by their permission.

to cause their exhaustion and consequent relaxation. Cold applications of long duration have the opposite effect: the muscles of the vessels then become more or less paralyzed, resulting in retardation of the blood current.

The thermo-mechanical effect of water on the action of the *heart* influences also the foregoing vascular changes. Cold water applications to the whole body, or a large part of it, decrease the frequency of the heart beats, especially by lengthening the time of diastole. The tone of the cardiac muscle is probably also enhanced. The heart itself is likewise influenced by the thermo-mechanical effect of water on the tone of the peripheral vessels. The constriction of these vessels resulting from cold water applications must naturally bring about an enhanced expenditure of energy on the part of the heart muscle. A cold bath, by producing a longer diastole and enhancing the work of the heart muscle, consequently has the combined effect of resting and exercising the heart, provided, of course, that the heart has sufficient strength to overcome the increased resistance in the peripheral vessels. If, nevertheless, cold water procedures are desired in cases, where the heart lacks this power, then the water should be administered in the form of local applications which, with the improvement of the heart, are extended gradually over increasingly larger areas.

The *blood pressure* is raised as a consequence of the constriction of the peripheral blood vessels. Mechanical stimuli contribute materially to the rise of the blood pressure.

Heat applications bring about dilation of the peripheral blood vessels. The resulting hyperemia (in contrast to the reactive hyperemia produced by cold stimuli) is atonic in character, because the contractile elements of the blood vessels and the tissues in which they are embedded relax under the influence of heat. The hyperemia produced by heat is, on the other hand, more pronounced than the reactive hyperemia produced by cold applications. Heat applications to the whole body surface increase the frequency of the pulse and probably lower the tone of the heart muscle. After a brief initial rise, the blood pressure is lowered. It must be borne in mind that this initial rise in blood pressure may become quite marked and quite prolonged, if the temperature of the bath is very high (above 104 degrees F.). Hence warm baths should be administered at a gradually rising temperature.

Effect on Respiration — In cold application, whether general or local, respiration becomes deeper and more frequent. Heat procedures at a temperature at or near the point of tolerance bring about the same, although less marked, physiological responses.

Effect on Secretion and Excretion — The sweat glands react readily to heat procedures. The fact that urea, the normal elimination of which is lessened in nephritis, can be excreted in quite a fair amount by diaphoretic applications, is of great therapeutic value. Hot water procedures, provided they produce abundant sweating, are also effective in eliminating certain pathological products and foreign substances, such as toxins, lead, arsenic, mercury, etc. The drinking of water during the eliminating bath enhances the removal of toxins from the tissues.

Cold applications, by raising the blood pressure, generally augment, temporarily, the secretion of urine. Increase of secretion of urine *without* rise in blood pressure is produced by tepid baths (94 to 96 degrees F.) continued for one to two hours. These baths, as pointed out by Strasser and Blumenkranz, in contrast to other hydrotherapeutic measures, increase also the total twenty-four hour output.[1, 2]

Very little is known about the effect of hydrotherapeutic measures on the secretion of the digestive glands. The results reported by some investigators are frequently at variance and sometimes even quite opposite to the findings of others.

Effect on the Nervous System — Local applications of short duration, whether cold or warm, seem to increase the sensibility of the nerves; while long continued local cold or warm procedures lessen their sensibility. Heat, however, is usually more effective in lessening pain than cold, especially in spasmodic conditions.

The central nervous system is decidedly influenced by hydrotherapeutic measures. The feeling of refreshment and enhanced vigor experienced after a brief cold bath, shower, or douche is too generally known to need further mention. Very warm wa-

ter, suddenly applied, has more or less the same effect. Mechanical stimuli aid materially in producing a tonic effect on the central nervous system.

Baths at a temperature of 94 to 95 degrees and of long duration (thirty minutes to two hours) and wet packs produce a decidedly sedative effect on the central nervous system and are measures of great therapeutic value in cases of nervous irritability and insomnia. Long continued baths at a higher temperature than 96 degrees cause nervous fatigue and should hence be avoided in all cases of nervous debility.

The effect of cold water measures is modified more or less by psychic influences. Some patients react unfavorably, on account of fear of cold water. This fear may be due to the discomfort experienced from incorrect technique, used in previous cold water applications, or to a generally apprehensive state of mind, or to a morâle enfeebled by delicate health, luxurious habits, or habitual indulgence in hot water bathing, etc.

Technic

A good reaction is a *sine qua non* in all cold water applications. Therefore, a rational hydrotherapeutic technique must, as far as cold water treatment is concerned, consist chiefly of means that tend to bring about a good reaction.

First of all the patient's reactive capacity should be ascertained. A reliable means of doing this is to wrap around the patient's forearm a cold, moist towel, on which are given brisk frictions for ten to fifteen seconds. If this application produces good reaction, the patient will, as a rule, react favorably also to water procedures involving a larger body area.

Since the effect of water depends chiefly on the difference in temperature between the skin and the water, it is important that the skin be sufficiently warm prior to the administering of any cold water application. The bathroom should hence be rather warm, 80 degrees being the optimum temperature, and the dressing room should be located near the bathroom, so as to prevent chilling of the skin while the patient passes from one room to the other. For the same reason the light cabinets in a hydrotherapy institution should be placed as near the douche room as possible.

In order that the difference in temperature between the cold water and the skin may be sufficiently marked, it is often advisable, particularly in delicate individuals, to warm up the patient by some artificial means preparatory to the cold water treatment. In home practice the simplest method of doing this is to wrap him in warm blankets and let him remain in them until he feels thoroughly warm. In institutional practice the most convenient method is to give him a brief light cabinet bath, previous to the cold water application. These warming up measures should be brief, because long continued heat applications lead to relaxation of the vessels with a lessening of their susceptibility to stimuli.

The water must be administered at a sufficiently cold temperature. If the patient does not respond to the cold application as readily as expected, do not on that account raise the temperature of the water. The milder water temperature being relatively nearer the temperature of the skin, the thermic stimulus is consequently too feeble to bring about a good reaction, resulting in chilliness and discomfort of the patient and depression of his vital powers. The rational method in such cases is as follows:

After a thorough investigation has proven all other details of the technique to have been correctly carried out, the administering of the water at the same temperature should be continued, but its application should be confined to a smaller area and for a shorter duration. As the patient becomes inured to the cold water, the area of application is gradually enlarged at each successive treatment until it finally includes the entire body surface. When this stage has been reached the duration is also gradually prolonged. The patient being now accustomed to the cold water, the temperature is lowered one-half or one degree every day, or every other day, until finally the desired maximum cold temperature has been reached. Under no circumstances must the patient be allowed to govern the regulation of the water temperature according to his own wishes. A methodical administering of the water — a requirement of the utmost importance in hydrotherapy — would in that way be impossible.

The duration of cold hydrotherapeutic ap-

plications should be *short,* one-half to three minutes. Exceptions to this rule are febrile conditions when the chief object of the application is to lower the body temperature, or cases of obesity in which the purpose is to augment the metabolism as much as possible.

The cold water should be applied suddenly, at the prescribed temperature. Applying water at a gradually reduced temperature during the treatment is usually not a satisfactory method, because the temperature of the water and skin will then become more or less equalized and hence lacking in the contrast of thermic effect that is required for the production of a good reaction. The correct technique is to maintain the temperature of the water at a definite degree during the application, reducing it one-half to one degree at every, or every other, successive treatment.

Simultaneous mechanical stimuli through the projective force from douches, etc., or through frictions performed either by the attendant, or still better by the patient himself, contribute considerably to a good reaction.

Certain pathological conditions, as pointed out by Strasser, are apt to react more or less abnormally to cold water applications. Highly irritable, nervous individuals respond irregularly, reacting for the most part poorly, showing a tendency to vascular spasmodic contraction. At other times these types respond excessively, exhibiting vasomotor disturbances with a tendency to dilation, as in hysteria and exophthalmic goiter. In diseases of the peripheral nerves the reaction is often poor. The same is true of febrile infectious diseases, due to toxic changes of the vasomotor innervation. Similar insufficiency of reaction is noticed in nephritis, this condition having a tendency to spasm of the renal vessels, as also in exophthalmic goiter and in chronic alcohol and morphine intoxications, due to the vascular atony that usually accompanies these cases. Patients with cardiac insufficiency, arteriosclerosis, anemia and chlorosis also react poorly to cold water treatment. A correct technique will, however, usually bring about a sufficient reaction in even these cases.[3]

Upon the termination of a cold water application the patient should be thoroughly dried off at once and be briskly rubbed on *top* of the enveloping sheet, *not with it.* The sheet used for drying of the patient should preferably be of linen, because linen absorbs water better than cotton, of coarse texture so as to enhance the mechanical stimulation, and large enough to enfold the patient completely. If circumstances permit, the patient should then dress immediately and be sent outdoors for a walk or some other form of muscular exercise. If his condition, or the inclemency of the weather, makes this impossible, he should be put to bed and should remain there, sufficiently covered with blankets, for one-half hour. After all cold water applications, it is necessary not only to guard against the patient's getting chilled but also against his becoming overheated. He should hence not be covered with too many blankets, and the temperature of the rest room should not be too high; 70 degrees is the optimum. Under no circumstances must the reheating be so pronounced as to produce even the slightest tendency to perspire. Such a result would, by its relaxing effect on the vaso-motor mechanism, counteract the benefits of the reaction.

Warm water applications are, in contrast to cold, usually most effective, if the temperature of the water is raised gradually during the treatment from the neutral point, or slightly above, up to the desired degree. The duration of warm hydrotherapeutic applications should, as a rule, be rather prolonged, usually thirty minutes to one hour. Mechanical stimulation is here of less importance, and should be omitted, when the object of the treatment is to produce a sedative effect.

After all heat procedures involving the whole or a large area of the body, it is important, on account of the relaxed, dilated state of the cutaneous vessels, to guard against the patient's catching cold. This danger is prevented, or at least lessened, by a brief cold application immediately following the heat procedure, whereby the tone of the cutaneous vessels and their normal capacity for responding to external cold temperatures by prompt contraction, is restored. The feeling of fatigue, so often experienced after heat applications, is also counteracted by a brief cold water application.

In cases of great nervous irritability, exophthalmic goiter, tabes, bronchitis, bronchial asthma, arteriosclerosis and nephritis, all of which respond rather poorly to cold, it is advisable to let the heat procedure be followed by a water application at neutral temperature (93 to 95 degrees F.), or by an alcohol rub at the same temperature.

In order to prevent congestion of the vessels of the cranial cavity and unpleasant symptoms resulting therefrom, such as dizziness, ringing in the ears, headache, etc., the patient's head should be cooled immediately before any cold or warm application involving all or a large part of the body, and should be kept cool constantly during the entire duration of the application.

I cannot stress too much the importance of giving the strictest attention to all the details of the technique, i. e., to choice of the right kind of application; to exactness in regard to temperature, duration and to the type and amount of added mechanical stimulation, and finally to the proper adjustment and modification of all these elements to meet the special needs of each individual case and for each stage of the case under treatment. Ignorance or neglect of these details is apt to lead to failure and disappointment and hence also to mistrust among the profession as to the value of hydrotherapy as a therapeutic agent, which unfortunately so often has been the case in the past.

Towel Bath

I would again remind you that lack of time for a detailed discussion of the various types of therapeutic water applications makes it necessary for me to mention only the most important. I will begin with the simplest of them all, the towel bath.

The patient lies in bed covered with blankets. Two towels are dipped in a pail of water at a temperature of 70 degrees to 60 degrees F. One of these towels is wrung out and wrapped snugly around one of the patient's arms. Brisk friction on the towel follows and is continued until the towel feels warm to the attendant's hands. The arm is then dried off and again placed under the blanket. The same procedure is then repeated on the other arm and on the legs, using the two moist towels alternately in order to secure the same temperature for each area treated. The chest, abdomen and back are then similarly treated. The whole procedure should not last more than five or ten minutes. If the object is to reduce the body temperature, the towel should be less thoroughly wrung out and the application may be repeated three or four times.

The towel bath has a mild tonic effect on the various body functions. It is a very valuable application, because it can be applied to bedridden and seriously ill patients. It acts furthermore as a preparatory measure to more powerful cold water procedures, and is a convenient indicator of the individual's reactive power.

Sheet Bath

Another convenient but in its effect more powerful water application is the sheet bath. In this procedure, a rough, linen sheet, two to three yards long and one and one-half yards wide is used. The patient is stripped and stands in upright position. The sheet having been dipped in cold water (80 degrees to 60 degrees F.) is rather thoroughly wrung out, then spread out, and wrapped around the patient's body from the axillae down, after which the remaining part of the sheet is brought around the arms and shoulders, so that he is completely enveloped in it. A fold of the sheet is then tucked between the legs, the object being to have no two surfaces of the body come in direct contact with each other. The patient, enfolded with the cold wet sheet, is immediately rubbed down with long vigorous strokes. The friction is continued until reaction sets in, which is noticeable by the sheet becoming warm to the attendant's hands. This reaction usually occurs in two to three minutes. The patient is then unwrapped, thoroughly dried, and according to the particular case, is put to bed for 15 to 30 minutes, or sent out for a walk in the open air. In the case of delicate patients it is advisable to let them stand with their feet in a tub of hot water (108-110 degrees F.) during the treatment.

Because the technique is so simple and also because no apparatus is needed, the sheet bath is a very useful hydrotherapeutic measure. The sheet bath causes a more powerful stimulation than the towel bath for the reason that all the different parts of the body come in contact with the cold sheet at almost the same time — its application

must hence be determined with more caution. It is a valuable remedy for restoring nervous tone and for redistributing blood in cases of hyperemia, congestion and stasis of the deeper organs. Furthermore, the sheet bath serves as a preparation for more powerful cold water measures (such as douches and baths). In home treatment, where a shower is not accessible, it may also be used as a cooling application after general heat procedures. In the case of delicate or highly nervous individuals, great caution should be exercised in administering the sheet bath, as many of them do not tolerate this treatment, unless they have been prepared for it by milder applications. The sheet bath, on account of its short duration, has very little if any effect on the body temperature.

The Drip Sheet Bath

When an *antipyretic* effect is desired, a modification of the sheet bath is used. This is known as the drip sheet bath. The sheet is less thoroughly wrung out than in the ordinary sheet bath. When the sheet has become warmed, as a result of the rubbing on it and reaction having set in, the attendant pours over it a basinful of cold water, five degrees lower than that in which the sheet was dipped, and renews the friction on the sheet, until it again becomes warm. This process may be repeated three to four times depending on the patient's vital power. If the patient is not able to stand up, the drip sheet bath is administered so that a cold wet sheet is spread over a cot or bed, protected by a rubber sheet. The patient is wrapped with this cold wet sheet in the same manner as already described and the frictions and pourings on of cold water ensue as I have explained before. The antipyretic effect is enhanced by letting the patient remain in the wet sheet, wrapping him in a blanket for one-quarter to one-half hour, the rubber sheet having been previously removed. Close attention should be given the patient's reactive capacity so that it does not become overtaxed. The latter condition is noticeable by paleness of the face, shivering, the sheet failing to warm up, etc. If any of these symptoms should appear the application should be terminated at once and the patient dried off by vigorous rubbing over a dry sheet, put in a warm bed, wrapped with sufficient number of warm blankets and a hot water bottle placed under the soles of his feet.

Packs

We now come to a discussion of another very useful form of hydrotherapeutic treatment, namely, the pack. On a bed or cot a large blanket is spread. On top of the blanket a coarse linen sheet, previously dipped in cold water (70 to 60 degrees F.) and well wrung out, is then spread. The patient is placed in a supine position on the moist sheet, so that the upper part of it reaches the nape of the neck. He is then wrapped first with the sheet in a manner similar to the sheet bath, and then with the blanket, after which one or two additional blankets are placed around him. Great care should be taken, so that both the sheet and the blankets fit snugly all the way from the neck down to the toes. A towel should be placed between the upper border of the pack and the patient's skin to avoid irritation of the latter. The parts of the sheet and blanket overlapping the feet are tucked under the heels.

The first effect of the cold wet pack is a shudder, accompanied by acceleration of the pulse and respiration. These phenomena do not last long, however. The cutaneous blood vessels, primarily constricted from the effect of the cold wet sheet, soon dilate and a reactive peripheral hyperemia follows, warming the skin. In fifteen to twenty minutes the patient usually feels quite comfortable. Heat is freely dissipated from the dilated peripheral vessels, but its escape from the pack is greatly retarded because of the poor conductivity of the blankets. Thus more and more heat accumulates between the skin and the sheet, so that the patient finally lies entirely enveloped in a layer of moist warm air, the temperature of which, however, rarely exceeds the body temperature. Under the influence of the highly sedative warm vapor, the patient soon becomes drowsy and often falls asleep in the pack. Von Schüller[4] found by experimentation with animals that the wet pack brings about a depletion of the cerebral vessels. This cerebral anemia contributes materially to the sedative effect. The absolute immobility of the patient in the pack and the entire lack of friction or other mechanical stimulation of the skin add still further

to the sedative, hypnotic influence. As soon as the reactive dilation of the peripheral vessels sets in, the primary acceleration of the pulse subsides, and is often followed by a retardation, the pulse rate sometimes even becoming considerably lower than it was before the application of the pack. The frequency of the respiratory movements is also decreased by the calming influence just referred to.

The therapeutic indications of the wet pack vary according to the duration of its application. If removed as soon as the wet sheet has become rewarmed, it has the same effect as the sheet bath, or any other cold water application of short duration involving the whole body surface, i. e., a generally invigorating influence on all the vital processes, but principally on the circulatory and nervous systems.

If renewed immediately after the sheet of the previous pack has become rewarmed, it has in addition an antipyretic effect. As each successive pack abstracts heat from the body and thus lowers the body temperature, it is obvious that a longer time is required after each renewal to rewarm the pack. Thus it happens that while in febrile cases it usually takes from five to ten minutes to rewarm the first pack, the second one ordinarily takes twice that time and the following packs still longer. Three to four renewals are generally sufficient to produce the desired fall in temperature, but in some cases of hyperpyrexia it may be necessary to repeat the renewal a great number of times. If, however, there are indications that the application is being overdone, as manifested by shivering of the patient or by the sheet failing to become rewarmed, the packs should be discontinued immediately.

Under normal conditions, at the termination of the last pack, the patient is cooled off at once by an ablution (70 to 60 degrees F.) or by a tub bath (80 to 70 degrees F.) of short duration (one-half to one minute), dried off, and put to bed, well covered with blankets. There is no reason to use the wet pack for antipyretic purposes if the patient's heart is perfectly normal and his vitality fairly good. In such cases cold baths are employed to better advantage.

I have already mentioned that the wet pack of three quarters to one and one-half hours duration has a decidedly quieting effect on the entire nervous system. For this reason it is indicated in many nervous disturbances, such as neurasthenia of the irritable type, motor neuroses, etc. Because of its quieting effect on the heart's action, it is also a useful measure in palpitation and exophthalmic goiter. It is in insomnia, however, that the wet pack is used to better advantage than anywhere else. To obtain the proper results in these cases the pack should be applied just before retiring. Upon the termination of the sedative pack, the patient should be gently washed off with a soft sponge dipped in water at neutral temperature (93 to 95 degrees F.). Following this the skin is gently dried off with smooth rhythmical strokes over a warm, finely textured linen sheet, the patient is put to bed, and the following morning before breakfast he receives a brief cold water application.

In cases of myocardial weakness, or in individuals who feel uncomfortable or frightened from being entirely enclosed in the wrapping, the wet pack is contraindicated. In these cases the sedative effect is lost, the pulse is accelerated and insomnia agravated rather than relieved. These objectionable features can be overcome, however, by using a modification of the full pack, known as the three-quarter pack.

The Three-Quarter Pack

In the three-quarter pack the wet enveloping sheet and the blanket extend only to the axillae, leaving the arms free. The exposed parts are covered separately with a baby blanket or shawl. This pack is only a little less effective than the full pack and is indicated where fright or a feeling of oppression make the full pack inadvisable.

Baths

Baths occupy another important position in the field of hydrotherapy. According to the temperature employed, baths are divided into three principal groups: cold, tepid, and warm baths.

Cold Baths — The *brief* cold tub bath of one-half to two minutes duration, applied with vigorous friction is a very valuable hygienic measure for robust, healthy individuals.

Cold baths of a relatively *long duration* have been much used in febrile diseases, particularly in typhoid fever, ever since the

middle of the last century. The extreme measures recommended by Dr. Brand are rarely used nowadays, however. In treating febrile diseases improvement of the tone of the heart and of the peripheral vessels is fully as important a factor, if not more so, as the lowering of the body temperature. This therapeutic requirement is better attained by employing baths at moderately low temperature, of comparatively short duration and with less frequent renewals. Upon this principle is based the method used in the famous Winternitz Clinic of Hydrotherapy in Vienna. This method is briefly as follows:

The first few baths are given at a temperature of 86 to 80 degrees F., with a duration of five minutes. With the rise of fever the temperature of the baths is successively lowered with each bath until finally 77 to 73 degrees F. is reached, and the duration is gradually increased up to ten or twelve minutes. This temperature and duration are continued during the acme. When the fever begins to subside the water temperature is rapidly raised, but the duration remains the same. Four to six baths are given during the stage of rising fever. This rate of tubbing is continued until the period of defervescence sets in when the frequency is rapidly decreased to one or two baths per twenty-four hours. Trunk compresses are applied during the intervals of the baths, if the effect of the latter is not sufficiently marked.[5]

After the patient has been gently lifted into the tub which is three-quarters filled with water at the desired temperature, he is rubbed briskly all over his body, throughout the whole duration of the bath. A small amount of colder water may now and then be poured gently over his head, if he is stuporous. The sudden contact with the cold water causes a primary shivering which soon disappears and should be prevented from reappearing by vigorous rubbing. If a secondary shivering, or other signs of failing reaction, occur the patient should be removed from the bath at once, dried off and put to bed, where he should be well wrapped in warm woolen blankets and a hot water bottle placed under the soles of his feet.

Upon the termination of the bath the patient is dried off and brought back to a warmed bed and given some nourishment. His tendency to sleep should be encouraged by the removal of all disturbing elements.

When nervous irritability is a prominent symptom, a slightly different method is used. While the patient is in the bath the bed is prepared with a large woolen blanket, smoothly spread across it, and over this a dry sheet is placed, both having been previously warmed. The patient, without being dried off, is placed on the dry linen sheet and wrapped snugly with it and with the blanket. More blankets may be added if needed. Evaporation from the wet skin ensues and soon the whole body is enveloped in a layer of vapor, which has a very soothing effect. This method has the disadvantage, however, that it counteracts more or less the antipyretic effect of the bath, and its tonic influence on the heart and the peripheral vessels.

Tepid Baths — The tepid baths are administered at a temperature of 94 to 96 degrees F. with a duration usually from fifteen minutes to one hour. After the bath the patient is enveloped in a warm, dry sheet and gently dried by long sweeping movements on top of the sheet and he is then put in a warmed bed.

As a result of the rather long continued contact of the skin with the tepid water, there is a fluxion of blood to the periphery with a corresponding depletion of blood in the deeper parts. The intracranial vessels become hence more or less empty and continue so far some time. A marked sedative effect is produced by the diminished blood supply of these vessels and by the local effect of the bath upon the cutaneous nerve endings.

Tepid baths are indicated wherever a soothing, sedative effect is desired, such as nervous irritability, insomnia, functional neuroses, and certain diseases of the central nervous system accompanied by spasticity, etc.

The tepid bath of thirty minutes to one hour's duration and administered about one hour before the patient is expected to sleep is a very valuable hydrotherapeutic measure in nervous insomnia. Although the first bath may not prove effective, a series of them will in most cases produce good re-

sults and sometimes even bring about a complete cure. In multiple sclerosis, tepid baths of fifteen minutes to one hour's duration administered every other day, are recommended by Laqueur in his excellent work on physical therapy.[6] Combined with the bath in these cases he advises gentle massage and passive movement of the legs, in order to relieve the spasticity by the soothing effect of the bath and at the same time combat the paralysis by the massage and passive movements.

Tepid baths of about one hour's duration are of benefit in renal insufficiency, augmenting, according to Strasser and Blumenkranz,[1, 2] not only diuresis but also eliminating NaCl and nitrogenous substances. In the treatment of renal insufficiency tepid baths are, therefore, more effective than diaphoretic measures, as the effect of the latter consists chiefly in dehydration through the skin with only relatively slight elimination of solid substances.

According to Eroess,[7] pyrexia of infants is benefited by tepid baths of ten minutes duration (five minutes for delicate children). He found from an extensive observation that not only was the temperature reduced, but that also irritability and sleeplessness usually disappeared and the general condition of the child improved.

The Continuous Bath — For the continuous bath a large tub is required, into which is suspended, hammock fashion, a strong sheet. A mixing chamber provided with a thermometer, a thermostatic valve, and a pressure gauge, should be connected with the supply pipes. By these devices a uniform temperature is maintained throughout the bath. After the tub has been filled with water at 94 to 99 degrees F. the patient is placed supine on the suspended sheet, his head resting on an inflated rubber pillow. If the skin peels as a result of long contact with the water, this condition may be prevented by greasing.

The temperature of 94 to 99 degrees F. should be kept uniform during the bath and the first few baths should last approximately one hour. This duration is gradually increased so that in some conditions (in mania for instance) the patient spends most of his time in the water. As a rule, no bath should be given during the night.

The continuous bath produces alterations in the distribution of the blood similar to the changes brought about by the ordinary tepid bath, although more pronounmed. A very sedative effect is produced on the whole nervous system by the long continued depletion of the cerebral vessels. Some investigators claim that the cutaneous nerve endings become swollen from the long contact of the skin with the water and that this change is a contributing factor in bringing about the sedative effect of this bath. The increased flow of blood to the periphery provides material for the repair of destroyed tissues.

The continuous bath is indicated in acute mania, various forms of hyperesthesia and spasmodic conditions, extensive burns, indolent ulcers, caries, gangrene, suppurating wounds, large abscesses, various forms of skin disease and in chronic inflammation of muscles, joints and bones.

Hot Baths — Another kind of bath, which, however, does not occupy such an important place in hydrotherapy as the cold or the tepid baths but which should be mentioned, is the hot bath. The temperature of the hot bath is from 100 to 110 degrees F. and the duration ten to twenty minutes. While the patient is in the bath the temperature of the water should be raised gradually from 96 to 98 degrees F. to the desired temperature. Upon the termination of the bath, the patient is given a brief general cold water application or, if elimination is the principal objective, he may be wrapped in three or more large blankets in which perspiration is continued from twenty minutes to one-half hour. After that the blankets are removed and the patient is given a brief cold water application or alcohol rub. The hot bath produces a rise in body temperature with augmentation of metabolism.

The hot bath is useful in obesity, gout, chronic arthritis and chronic myositis. Massage of the patient while in the bath may be administered in these conditions. Because of its diaphoretic effect the hot bath is also indicated in exogenous and endoenous intoxications, metal poisoning, edema, etc. In these conditions, however, the light cabinet bath is superior to the hot water bath, and whenever the object is to produce elimina-

tion by diaphoresis. The hot bath is contraindicated in diseases of the heart, arteriosclerosis, aneurism, tendency to hemorrhage, functional neurosis and tabes.

Whirlpool Bath — In the category of *local* hot baths I shall only describe the whirlpool bath. The temperature of this bath and the force of the current is regulated during the treatment by means of a mixing chamber connected with the supply pipes and provided with a thermometer, a thermostatic valve and a pressure gauge. The temperature at the beginning of the bath is 96 to 98 degrees F. and is gradually raised during the immersion of the limb to the point of the patient's tolerance, 110 to 115 degrees F. The current may be directed to a specific part of the limb, if the thermo-mechanical effect of the water current is especially desired at that area. The bath lasts fifteen to thirty minutes and is usually repeated once a day. The combined effect of the high temperature and the motion of the water gives rise to a decided stimulation of the circulation of the immersed part of the limb; pain and spasm are relieved and the tissues become more supple and relaxed. Softening, dissolution, absorption and removal of inflammatory products in the tissues are promoted, and nutrition and repair of wounds and destroyed tissues furthered. Removal of dirt, pus and necrosed tissue is also promoted by the flow of the hot water.

The whirlpool bath is indicated in a number of pathological conditions of the arms and legs, such as painful stumps, painful scars, adhesions, inflammation of joints, muscles and tendon sheaths, purulent wounds, indolent ulcers, etc.

Douches — In presenting the therapeutic use of douches I shall mention only the most important one, the fan douche. The name of this douche is derived from the fact that the stream of water is spread out in the shape of a fan. The fan douche may be applied either generally or locally. The mechanical stimulation produced by it is less pronounced than that caused by the douche with a solid water stream, the so-called jet douche, but nevertheless it is sufficient to constitute an unfavorable element in conditions such as high nervous irritability, tendency to hemorrhage, aneurisms, advanced arteriosclerosis and high blood pressure. The fan douche may be employed either at uniformly cold temperature or alternately at cold and warm temperatures.

The *cold* fan douche is administered at a temperature of 88 to 60 degrees F., and usually requires a pressure of twenty to thirty pounds. The duration is one-half to three minutes.

In using the *alternating* or so-called Scotch douche we always begin with the hot and finish with the cold stream, the temperature of the former being 108 to 115 degrees and of the latter 86 to 60 degrees F. The alternation is usually repeated three to four times; if the douche is applied to a small area the number of changes may, however, be greater.

The principal merit of douches is the ease with which the mechanical stimulation of the water can be regulated and exactly measured and the facility with which the contrasting temperatures can be alternatingly applied without the slightest delay.

The cold douche of short duration has the same invigorating effect on the body functions as the brief cold bath and other general cold water procedures in which the thermic stimulation of the water is combined with mechanical stimulation. It has no antipyretic effect, however, because of its brief application. A series of cold douches gradually and systematically reduced in temperature, increased in pressure and prolonged as to duration brings about an enhanced state of vigor and endurance and may sometimes restore permanently to a normal condition, functional disturbances characterized by insufficient vital energy, nervous and vascular atony or instability. The cold douche of one-half to two minutes duration is also an excellent cooling off procedure after heat applications.

The alternating fan douche, when applied to the whole body is, like the cold douche, indicated in cases where a general invigorating effect is desired and especially in conditions of insufficient muscular tone and sluggish circulation. Applied to the chest it is useful in catarrhal conditions, to soften and absorb viscous mucus and to facilitate expectoration. Directed to the abdomen, it

is indicated in venous stases of the abdominal organs, hyperemia of the liver and in motor insufficiency of the stomach and intestines.

CO_2 Bath — Thus far I have spoken of the therapeutic use of plain water. I shall now discuss a type of water application of quite a different kind, the CO_2 bath. The CO_2 bath is an effervescent saline bath consisting of three components — water, salts and CO_2. Natural CO_2 baths have been in use for a long time at different spas, notably at Nauheim, in Germany. Artificial substitutes have necessarily been devised for those who are unable to take the so-called cure at these resorts. In order that the artificial CO_2 bath may be of the greatest therapeutic effectiveness the gas bubbles should be of minute size and closely adherent to the water. This requirement is best fulfilled by using a CO_2 mixing apparatus, in which the water under high pressure, is thoroughly impregnated with CO_2. For this purpose a minimum of 50 pounds of water pressure per square inch is necessary. If this is not available a force pump may be used to raise the water pressure to the required point.

Another way of carbonizing the bath is to dissolve chemical preparations in the water of the tub. This method is not so satisfactory because the gas bubbles generated in this way are large, unevenly distributed in the water, and, because they are only loosely bound to the water and hence escape rather easily into the air. It is, however, a convenient method, as it requires no apparatus.

Still another, but the least satisfactory method, is to let CO_2 flow directly into the bath through bamboo or rattan reeds, placed at the bottom of the tub and connected by means of a rubber tube with a tank containing CO_2.

To get the full benefit of the bath the patient should enter the tub as soon as it is ready, because the CO_2 gas escapes gradually from the water. Immediately after entering the bath the patient's skin is covered with innumerable minute gas bubbles, he experiences a tingling sensation and a pleasant feeling of warmth and comfort, and his skin becomes a bright pink. The patient must remain perfectly still in the water, so that the bubbles will stay on his skin. At the conclusion of the bath he is gently dried off with a warm linen sheet and put to bed for one to two hours.

A temperature of 94 to 93 degrees F. is used for the first few baths. As the patient's condition improves and a stronger thermic effect on the blood vessels and heart is desired, the temperature is reduced from time to time one degree but never below 86 degrees F. The duration of the baths is prolonged gradually from six to eight minutes, to twelve to fifteen minutes later on in the series.

The frequency of the CO_2 baths is also progressive in character. I usually give three baths during the first week, increasing the frequency gradually, so that the patient receives five to six baths during the fifth week. The total number of baths in a series varies according to the condition of the patient and the effect of the baths in the individual case. A total of more than thirty baths should, however, not be exceeded. If at that time the patient's condition has not improved sufficiently the CO_2 baths should nevertheless be discontinued. They may be resumed in six to eight weeks, if deemed advisable at that time. The CO_2 saturation of the bath is also gradually increased and the NaCl is added to the water in proportionately greater amounts, from four pounds for the first few baths to eight pounds later in the series.

A strict individualization is necessary, and I cannot emphasize too much the importance of letting the requirements in each case and the effect of the preceding baths in the series govern the temperature, duration and frequency, as well as the degree of saturation of the water with CO_2 and NaCl.

From a therapeutic standpoint the most important effect of the CO_2 bath is its influence on the blood vessels and on the action of the heart. By the summate effect of the water temperature and the CO_2 on the cardio-vascular system, functional changes are produced which both facilitate and increase the work of the heart. By judiciously regulating the temperature and the amount of CO_2 either of these effects can be made the more prominent. However, in order to obtain favorable results it is necessary for the heart to have a certain amount of reserve power. Hence cases of pronounced broken compensation are not amen-

able to the CO_2 bath, at least not those of the artificial type.

And here ends my brief talk on this vast subject, which, however, may have seemed long to some of my listeners.

It has given me much pleasure, indeed, to appear before this body and thus perhaps to help in a small way to advance the study of a subject in which we are all interested, but which, unfortunately, is less known than it deserves to be.

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PHYSICAL THERAPY IN DERMATOLOGY AN APPRAISAL BASED ON RESULTS IN PRACTICE *†

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Between October, 1921, and January, 1931, I treated 7,206 private patients. Of this number, 3,541 (49.1 per cent) received some form of physical therapy, as indicated in table 1.

My equipment has consisted of: (1) a roentgen machine with an 8 inch (20.32 cm.) maximum point gap and a medium focus Coolidge tube, (2) a portable telatherm for electrodesiccation and coagulation, (3) a Kromayer mercury arc water-cooled quartz lamp, (4) an electrolytic outfit and (5) 10 mg. of radium in a half-strength flat-glazed applicator.

In roentgen treatment, the technic and measurement of dosage of MacKee [1] were always used, and throughout this paper the word "unit" refers to MacKee's standard of dosage. The factors for a 1 unit dose were: 3 milliamperes, a 6 inch spark gap, a distance of 8 inches (20.32 cm.) from the target to the skin, and two minutes' time. A filter was seldom used. In electrodesiccation and coagulation the technic described by Wyeth [2] has been used, an ordinary sewing needle serving as the working electrode.

TABLE 1.—*Number of Patients Treated by Physical Therapy*

	Number	Per Cent
Patients treated by roentgen rays	2,570	72.6
Patients treated by desiccation	812	22.9
Patients treated by electrolysis	76	2.1
Patients treated by radium	19	0.5
Patients treated by ultraviolet rays	64	1.8

All of the reported observations were made on private patients. Some of the diagnoses were confirmed by laboratory examinations, but most of them were purely clinical. In most cases, in order to secure the quickest possible relief, supplementary treatment was given, both local and systemic, and sole reliance was not placed on physical therapy.

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A large number of these patients have been followed up after their discharge, but this has not been possible in all instances. Therefore, the chief emphasis will be placed on the immediate results of treatment, as noted in my office.

Treatment by Means of Roentgen Rays

Patients with acne vulgaris were usually treated with the roentgen rays. In addition to this, treatment was usually given for the coexisting seborrhea capitis; sugars and fats were strictly excluded from the diet, with concessions when needed to prevent undesirable loss of weight, and general hygienic measures were instituted. No local applications were prescribed, and the use of greasy toilet preparations was forbidden. The usual dose of roentgen rays was one-fourth unit, unfiltered, according to MacKee, and treatments were given every seevn days, every fifth or sixth one being omitted, in order to prevent too great cumulative action. The results of treatment have been tabulated according to age and sex (table 2).

TABLE 2.—*Results in the Treatment of Patients with Acne Vulgaris*

Age	17 and Under		18 to 20		21 to 25		26 and Over		
Sex	Male	Female	Male	Female	Male	Female	Male	Female	Total
Number starting treatment	67	57	73	95	47	125	15	114	593
Number stopping prematurely	21	9	32	19	17	31	7	31	167
Number stopping when improved	3	2	1	6	1	7	1	6	27
Number completing treatment	43	46	40	70	29	87	7	77	399
Number cured with one course	37	37	30	61	21	76	6	67	335
Percentage	86.0	80.4	75.0	87.1	72.4	87.3	85.7	87.0	84.0
Aver. treatments to cure in one course without recurrence	12 (13 weeks)	12.1 (13 weeks)	12 (13 weeks)	12 (13 weeks)	13 (13 weeks)	11.76 (13 weeks)	9.66 (11 weeks)	12.53 (14 weeks)	11.75 (13 weeks)
Number recurring once	3	5	8	2	6	8	1	9	42
Percentage	7.0	10.8	20.0	2.8	20.7	9.0	14.3	11.7	10.5
Number recurring twice	3	2	0	3	0	1	0	0	9
Percentage	7.0	4.3		4.2		1.1			2.2
Number recurring 3 times	0	1	1	1	1	2	0	0	6
Percentage		2.1	2.5	1.4	3.4	2.3			1.5
Number recurring 4 times	0	0	1	0	0	0	0	0	1
Percentage			2.5						0.25
Number recurring 5 times	0	0	0	0	0	0	0	1	1
Percentage								1.3	0.25
Total recurrences	6	8	10	6	7	11	1	10	59
Percentage	14.0	17.4	25.0	8.5	24.0	12.6	14.3	13.0	14.7
Failures	0	1	0	3	1	0	0	0	5
Percentage		2.1		4.2	3.4				1.2

It was noted that a number of the cases became aggravated during the first three or four weeks of treatment. After this temporary exacerbation the condition cleared up uneventfully.

Most of the recurrences were apparently due to errors in diet, and were quickly cured when these were corrected. Some were due to irregularity of treatment, which necessitated a somewhat greater total number of exposures to complete the tardy cure. In several cases, cysts recurred for which treatment had to be given. Usually the recurrences were mild, and the additional treatment was limited strictly to the parts affected, every fourth or fifth treatment being omitted. The data in table 2 indicate that acne in children is not more stubborn than that in older patients.

Patients with rosacea were treated by regulation of the diet, attention to the seborrheic scalp and general hygienic measures, usually with the aid of roentgen rays administered exactly as in the cases of acne vulgaris. The results of treatment are given in table 3.

The recurrences were mild and apparently were due to errors in diet, especially the abuse of alcohol. Of the eight failures, three cases cleared up after cholecystectomy, while in two, the patients had stubborn sinus and tonsillar infections. The remaining three cases were of the purely erythematous type, which fortunately was not frequently encountered in this series. As in acne vulgaris, the eruption frequently became aggravated during the first few weeks of treatment, apparently due to some action of the rays;

TABLE 3.—*Results in the Treatment for Rosacea*

Number of patients treated	127	
Number of males treated	47	
Number of females treated	80	
Number stopping prematurely	44	
Number finishing treatment	83	
Number of cures in one course	71	(85.5%)
Average number of treatments required to cure in one course	13.23	(14 to 15 weeks
Number of recurrences	4	(4.8%)
Number of failures	8	(9.6%)

however, these patients recovered completely, as a rule, in the average length of time.

In the cases of sycosis vulgaris and folliculitis barbae, the value of irradiation did not seem to exceed 40 per cent, and much better results were obtained by the regular use of local applications under strict supervision. Permanent epilation was not attempted, and although temporary epilation was done in only three of the forty-three cases, it appeared to be effective only once. I have seen sycosis persisting in areas atrophic from previous irradiation. Of fifteen patients treated without the rays, twelve were cured in a few weeks, and two in whom one recurrence took place were also finally cured. One patient discontinued treatment too early for comment.

For patients with folliculitis nuchae and axillaris, fractional irradiation seemed more valuable, and was always used in combination with mild local antiseptic treatment. Four of eight patients with folliculitis nuchae received roentgen treatment in one-fourth unit doses. One was cured after twelve treatments, and another after fifteen; neither had recurrences. A third patient seemed to be cured after five treatments and a fourth after four, but both had recurrences within a few months; the recurrences cleared up, like the cases of sycosis, without further irradiation, under local applications of alcohol and gradually strengthened ointments of ammoniated mercury and salicylic acid in benzoinated lard. Three other patients were also cured following the application of the antiseptic ointments without irradiation.

Three patients with acne keloid were treated. One stopped treatment prematurely. A second patient was improved and stopped after six weeks of semi-intensive treatment. In the third patient, the condition resisted twelve one-half unit doses, and finally thirteen 1 unit doses, closely limited to the individual lesions, were needed to complete the cure.

Probably owing to midwestern climatic peculiarities, irradiation has not been needed in the treatment for tinea tonsurans. All patients have been cured with local applications containing iodine or thymol. Used in conjunction with mild parasiticidal applications, fractional doses of roentgen rays seemed to hasten the cure of several stubborn eczematoid patches of tinea corporis, and appeared to be of some help in similar, but deeper and more resistant, lesions of bovine origin, due to *Trichophyton ochraceum*. However, similar conditions cleared up almost as promptly when stronger parasiticides were used instead of irradiation. The same may be said of tinea cruris, which, in my series, responded well to mild parasiticides and required no irradiation. In four cases of tinea unguium of the fingers, semi-intensive (one-half unit) doses were used every two weeks, together with potassium permanganate and mild ointments of thymol. In two cases of several years' duration, the patients were not improved after five or ten one-half unit doses. One patient, in whom the condition had been present for a year, was cured after six such treatments, and another, in whom the condition was of two months' duration, was cured after six treatments, given at irregular intervals so that their real value was somewhat doubtful. In a stubborn case of sporotrichosis, five 1 unit doses of the rays, with iodides internally, completed the cure.

In dermatophytosis fractional irradiation was often employed, especially in cases of the eczematoid variety, always in combination with mild parasiticidal applications, such as potassium permanganate and preparations of thymol, frequently combined with 2 per cent salicylic acid. The results are shown in table 4.

Although the feet had been examined in

TABLE 4.—*Results in the Treatment of Patients with Dermatophytosis*

1. Location of eruption	Hands and Feet	Feet Alone	Hands Alone	Total
2. Number of patients given irradiation	184	109	220	513
3. Number cured with one course (with no known recurrence)	106 (57.6%)	69 (63.3%)	139 (63.0%)	314 (61.2%)
4. Number relieved with one course (with no known recurrence)	22 (11.9%)	12 (11.0%)	21 (9.7%)	55 (10.7%)
5. Number cured and relieved with one course (3 plus 4)	128 (69.5%)	81 (74.3%)	160 (72.7%)	369 (71.9%)
6. Average number of treatments for cure without recurrence	9.5 (10-11 weeks)	8.0 (9 weeks)	7.7 (8-9 weeks)	8.4 (9 weeks)
7. Number cured after one recurrence	22 (12.0%)	13 (11.9%)	31 (14.0%)	66 (12.8%)
8. Number relieved after one recurrence	5 (2.7%)	0	6 (2.8%)	11 (2.1%)
9. Number cured and relieved after one recurrence (7 plus 8)	27 (14.7%)	13 (11.9%)	37 (16.8%)	77 (15.0%)
10. Number cured after two or more recurrences	10 (5.4%)	5 (4.6%)	12 (5.4%)	27 (5.2%)
11. Total recurrences (9 plus 10)	37 (20.1%)	18 (16.5%)	49 (22.2%)	104 (20.2%)
12. Number relieved after two or more recurrences (failures)	6 (3.2%)	0	1 (0.4%)	7 (1.3%)
13. Other failures	13 (7.0%)	10 (9.0%)	10 (4.5%)	33 (6.4%)
14. Total failures (12 plus 13)	19 (10.2%)	10 (9.0%)	11 (4.9%)	40 (7.7%)

all cases, perhaps infection of the feet was present more commonly than the figures in table 4 seem to indicate. But when the hands alone were treated, the results were surprisingly good, in comparison with the other two groups. Perhaps this was due to the favorable action of the rays on eczematoid eruptions, regardless of etiology. However, if the infection of the feet had been present originally and treatment had not been given, because undiscovered, a greater number of recurrences on the hands would be expected. Of course, other possible etiologic factors were carefully excluded, but there is a possibility that some of the eruptions on the hands diagnosed clinically as dermatophytosis, in the absence of positive microscopic and cultural observations, were really due to other causes.

Persistent infection of the toe-nails, which resisted irradiation, appeared to be the chief stumbling block and probably caused many of the failures. Impaired circulation due to varicose veins also accounted for several failures, the eruption clearing up when this condition was corrected. Most of the eruptions in which irradiation had failed, cleared up later under stronger ointments, containing thymol and from 3 to 8 per cent salicylic acid. Several patients seemed overtreated, and improved when an ointment of boric acid was applied.

Six patients with stubborn infectious eczematoid dermatitis, in various locations, were cured after the administration of from three to nine (averaging five) one-fourth unit doses, together with rubbing alcohol and 2 per cent ointments of ammoniated mercury.

Patients with localized neurodermatitis and lichenification usually received fractional irradiation plus mild antipruritic ointments. The clearcut cases were classified as true neurodermatitis, while those developing secondarily to seborrheic dermatitis, tinea, dermatitis venenata, eruptions of allergic origin, occupational dermatoses, erythema toxicum, varicose dermatitis, senile pruritus and pruritus ani, vulvae or scrotalis were classified as cases of lichenification. Table 5 shows the results of treatment in these cases.

Although one patient with localized neurodermatitis required seventeen treatments, the condition finally responded; no failures were recorded in either group. Localized recurrences responded favorably to irradiation, but, of course, tar and other remedies may have to be substituted at times if lesions recur too frequently in the same location.

Eleven cases of generalized neurodermatitis were encountered, with their usual stubborn characteristics and persistent tendency to recur in spite of treatment. All of the patients were helped by roentgen rays from time to time, but four cases have now been classified as failures. In dealing with such cases, too much reliance must not be placed on irradiation. Preparations of tar

TABLE 5.—*Results of Treatment in Cases of Neurodermatitis and Lichenification*

Diagnosis	Neurodermatitis	Lichenification
Number of patients treated	71	148
Number of cured of one outbreak	56 (78.8%)	124 (83.7%)
Number cured of two outbreaks	9 (12.6%)	12 (8.1%)
Number cured of three outbreaks	3 (4.2%)	7 (4.7%)
Number cured of four outbreaks	1 (1.4%)	3 (2.1%)
Number cured of five outbreaks	1 (1.4%)	2 (1.3%)
Number cured of six outbreaks	1 (1.4%)	0
Total recurrences	15 (21.2%)	24 (16.3%)
Average number of treatments to cure in one course	6.5 (6 weeks)	5.6 (5 weeks)
Failures	0	0

TABLE 6.—*Results in the Treatment for Seborrheic Dermatitis*

Sex	Males	Females	Total
Number completing treatment	107	221	328
Number cured with one course	78 (72.9%)	180 (82.5%)	258 (78.6%)
Number with one recurrence, cured	16 (14.9%)	20 (9.1%)	36 (11.0%)
Number with two recurrences, cured	6 (5.6%)	8 (3.6%)	14 (4.2%)
Number with three recurrences, cured	2 (1.8%)	8 (3.6%)	10 (3.0%)
Number with four recurrences, cured	1 (0.9%)	1 (0.4%)	2 (0.6%)
Number with five recurrences, cured	0	1 (0.4%)	1 (0.3%)
Number with six recurrences, cured	0	0	0
Number with seven recurrences, cured	1 (0.9%)	0	1 (0.3%)
Total recurrences	26 (24.1%)	38 (17.1%)	64 (19.4%)
Average number of treatments per course	5.2 (4-5 weeks)	4.9 (4 weeks)	5 (4 weeks)
Failures	3 (2.8%)	3 (1.3%)	6 (1.8%)

will often have to be substituted, to avoid undesirable sequelae, while the etiologic factors are sought.

Many patients with seborrheic dermatitis received irradiation, always accompanied by appropriate ointments, attention to the scalp and dietary restrictions. The results of treatment in these cases are shown in table 6.

In the cases recorded in table 6, the recurrences, although frequent, responded well to further treatment. However, too much repeated irradiation of any one area must be guarded against. Many recurrences may be avoided by continued attention to the scalp and diet after a cure has been effected.

Among the 246 cases of psoriasis observed, the scalp was found to be involved in at least 202 (81.2 per cent) patients. One-fourth unit doses of roentgen rays at weekly intervals were employed, and one-eighth unit doses for the scalp. Fifty-two patients stopped treatment prematurely, and nine did not receive irradiation. The results appear in table 7.

In all of the failures and in nine other stubborn cases, other forms of treatment were occasionally used. The lesions on the scalp responded well to the one-eighth unit doses, and no defluvium was observed. In psoriasis, as in other recurring eruptions, too frequent courses of irradiation must not be used in any one area.

Fifty-nine patients with lichen planus were observed, the ages varying from 16 to 69 years. There were twenty-seven males and thirty-two females, and in all but seven the eruption was of less than one year's duration. Forty-four received at least one course of roentgen treatment. There were two failures (4.5 per cent) and forty-two cures (95.5 per cent. Thirty-nine were cured with one course (88.6 per cent), while three required two courses (6.9 per cent).

Of the forty-four patients treated, seventeen received local irradiation plus ointments. The cases comprised the milder and more localized eruptions. Sixteen (94 per cent) of these patients were cured with one course, averaging 4.3 treatments per course. In one patient (6 per cent) there was one recurrence, requiring two treatments to cure each outbreak. No failures were observed.

Sixteen of the patients received local fractional irradiation, ointments and intramuscular injections of mercuric salicylarsenate twice a week. These patients had severe, localized or generalized cases. Thirteen (81.2 per cent) of the patients were cured

with one course, averaging 9.1 treatments to a course. (One cure in five treatments occurred in a case in which a local recurrence obtained four months after a generalized outbreak had been cleared up with spinal and local irradiation, without mercuric salicylarsenate.) In one patient (6 per cent) a recurrence occurred after four years, and the patient was cured by twenty-one local fractional treatments, supplemented, during the final month, with three one-half unit doses to the entire spine, and without the use of mercuric salicylarsenate. Treatment failed in two cases (12.5 per cent). One patient, a woman, aged 34, had general and local outbreaks of four months' duration, which recurred and resisted local irradiation and the injection of mercuric salicylarsenate. The other patient, a woman, aged 38, had a generalized hypertrophic eruption, the most severe case in the entire series, which resisted all forms of treatment, spinal therapy not being in use at that time.

Thirteen other patients received local fractional irradiation to the worst areas once a week, plus semi-intensive (one-half unit doses) unfiltered treatment of the entire spine (in two areas) at intervals of two weeks. These cases were all severe and generalized. Twelve (92.3 per cent) patients were cured with one course, averaging 6.8 one-fourth unit doses to the worst lesions and 3.86 one-half unit doses to the spine. In some local areas, to which irradiation was not applied directly, the condition cleared up under this treatment. (One cure, after twenty-one local one-fourth unit doses, supplemented with three one-half unit doses to the spine, was in a case recurring four years after having been cleared up with mercuric salicylarsenate plus eleven local irradiations.) In one patient (7.7 per cent) a recurrence took place after four months, and the patient was cured by five local one-fourth unit doses plus injections of mercuric salicylarsenate. There were no failures.

In the case of a woman, aged 58, who was under local plus spinal treatment, the condition was widespread and severe, of five months' duration. It had nearly cleared up after four weeks of treatment, when a sudden flare-up on the abdomen occurred immediately after an automobile accident. This was cured in two weeks, after another spinal treatment and two more local treatments. Irradiation seems helpful in severe, stubborn and recurring cases, and there is apparently some advantage in spinal irradiation. Mercuric salicylarsenate is apparently helpful, but acts more slowly. No form of treatment insured the patient against recurrence.

Six cases of otherwise uncontrollable cutaneous pruritis, of undetermined origin, cleared up after from two to eleven fractional treatments, the average number being 5.6. Patients with pruritus ani, vulvae or scrotalis were usually treated with roentgen rays in combination with cleansing and soda baths, douches and mildly antiseptic antipruritic ointments. Treatment was also given for coexisting conditions, such as tinea or seborrhea. The results of treatment are given in table 8.

Pruritus ani occurred more commonly in males, in whom it had a greater tendency to recur than in females. Irradiation helped to relieve the patients in every case. The

TABLE 7.—*Results in the Treatment for Psoriasis*

Number completing treatment	185
Number cured	177 (95.7%)
Number cured of one outbreak	109 (58.9%)
Number cured of two outbreaks	26 (14.0%)
Number cured of three outbreaks	12 (6.4%)
Number cured of four outbreaks	11 (6.0%)
Number cured of five outbreaks	5 (2.7%)
Number cured of six outbreaks	3 (1.6%)
Number cured of seven outbreaks	2 (1.0%)
Number cured of eight outbreaks	4 (2.1%)
Number cured of nine outbreaks (in a four-year period)	1 (0.5%)
Number cured of ten outbreaks (in a three-year period)	1 (0.5%)
Number cured of eleven outbreaks (in a six-year period)	1 (0.5%)
Number cured of fourteen outbreaks (in eight- and four-year periods)	2 (1.0%)
Total recurrences	68 (36.7%)
Average number of treatments per course	5.7 (5 weeks)
Failures	8 (4.3%)

dosage used was one-half unit at the first treatment, one-third unit at the second and one-fourth unit at the third and each succeeding treatment; the interval was one week.

Two patients with prurigo nodularis, of six months' and sixteen years' duration, respectively, were benefited after long courses of fractional and semi-intensive irradiation, but neither could be completely cured.

In two of three cases of tuberculosis verrucosa cutis, and one of tuberculosis colliquativa, roentgen treatment in doses of from 1 to 1⅜ units was effective, eight or nine exposures being required. One patient with Boeck's sarcoid on the buttocks was cured with seven one-half unit doses, but two other patients with sarcoids on the face and shoulders could not be cured by irradiation. A case of erythema induratum also proved resistant.

Four patients with granuloma annulare received roentgen treatment in one-half unit doses. Three were cured with from five to seven treatments, and there have been no recurrences. In one patient the condition cleared up after ten one-half unit doses, but there was a recurrence in three months, and eleven more one-half unit doses, carefully spaced, together with solution of potassium arsenite, were required to complete the cure.

Irradiation was employed in twenty-two cases of verruca vulgaris, and six (27.2 per cent) known cures resulted, two following a single dose of 2 units, one treatment with 1½ units, two treatments with 1 unit, and one in four exposures in which doses of one-half unit had been used; there were no filters. Twenty patients with plantar warts were given a dosage of from 2 to 3 skin units, closely shielded. Nine were cured after one exposure, one after two treatments, and the rest failed to respond (50 per cent) and were cured by deep electrodesiccation. Juvenile warts are here today and gone tomorrow. Twenty-four patients received one-fourth unit or one-half unit doses of roentgen rays. Five of them were cured, possibly by the rays or perhaps by the power of suggestion. In some of the failures, mercury protiodide, sulpharsphenamine and various local applications were used without benefit. Irradiation was applied in one-fourth and one-half unit doses in four cases of filiform warts of the neck. Three failed to respond, and the fourth case cleared up after one-half unit dose, but recurred, and desiccation had to be performed. One case was observed in a woman in whom a second degree radiodermatitis of the face had been produced in an overzealous attempt to remove juvenile warts. The warts persisted, being more numerous than ever.

Forty-four patients with senile or seborrheic keratoses were cured by from one to four applications of moderately intensive irradiation (1¼ or 1½ units, unfiltered). In one case a keratosis on the ear did not respond to one treatment and was removed by electrodesiccation. Desiccation appears to be at least as satisfactory as irradiation, and one treatment usually suffices. Three or four fairly intensive (1½ unit) doses of roentgen rays were applied after the re-

TABLE 8.—*Results in the Treatment of Patients with Pruritus Ani, Vulvae and Scrotalis*

Diagnosis	Pruritus Ani			Pruritus Vulvae	Pruritus Scrotalis	Pruritus Ani and Vulvae	Pruritus Ani and Scrotalis	Total
	Males	Females	Total					
Number treated	36	8	44	30	17	2	11	104
Average treatments to cure in one course	5.6 (1 to 10)	5.7 (3 to 8)	5.65 (1 to 10)	5.57 (2 to 16)	3.8 (2 to 7)	3.0 (2 to 4)	6.0 (3 to 12)	4.8 (1 to 16)
Number requiring one course	27 (75.0%)	7 (87.5%)	34 (77.2%)	25 (83.4%)	15 (88.3%)	2 (100.0%)	9 (82.0%)	85 (81.7%)
Recurrence requiring second course	6 (16.6%)	0	6 (13.6%)	2 (6.6%)	2 (11.7%)	0	0	10 (9.6%)
Recurrences requiring third course	2 (5.5%)	0	2 (4.5%)	3 (10.0%)	0	0	1 (9.0%)	6 (5.7%)
Recurrences requiring fourth course	0	0	0	0	0	0	1 (9.0%)	1 (0.9%)
Recurrences requiring fifth course	0	1 (12.5%)	1 (2.2%)	0	0	0	0	1 (0.9%)
Recurrences requiring sixth course	1 (2.8%)	0	1 (2.2%)	0	0	0	0	1 (0.9%)
Total recurrences	9 (25.0%)	1 (12.5%)	10 (22.7%)	5 (16.6%)	2 (11.7%)	0	2 (18.0%)	19 (18.3%)
Failures	0	0	0	0	0	0	0	0

moval of all cutaneous horns with infiltrated bases, in order to destroy any beginning malignant process that might remain. Eight patients were treated, after curettement or desiccation, with good results in seven. In the eighth case, presenting slight infiltration beneath a large horn on the lower lip, more intensive irradiation was given, but the condition responded only temporarily. Several arsenical keratoses disappeared after three exposures of 2 and 1½ units, but desiccation was a quicker and better method of removal. The same appeared to be true of leukoplakia of the lower lip.

In the treatment for basal cell epithelioma, the dosage was from 1½ to 2 skin units for the first exposure, followed by 1½ units, usually at intervals of four weeks. No filter was used. Treatments were given for epitheliomas of from several months' to twenty-two years' duration, whether small and superficial or large and fairly deep. The eyelids were involved in nine cases. Electrodesiccation was used as a supplementary procedure to replace curet in some instances. The results are given in table 9.

TABLE 9.—*Results in the Treatment of Patients with Basal Cell Epithelioma*

	Two Treatments		Three Treatments		Four Treatments		Five Treatments		
	X-Ray Alone	Plus Desiccation	X-Ray Alone	Plus Desiccation	X-Ray Alone	Plus Desiccation	X-Ray Alone	Plus Desiccation	Total
1. Number cured	4	2	8	3	80	8	11	1	117 (93.6%)
2. Number recurring	0	0	0	0	2	0	1	1	4 (3.2%)
3. Number of failures	0	0	1	0	1	0	0	0	4 (3.2%)*
Total failures (2 and 3)	0	0	1	0	3	0	1	1	8 (6.4%)
Total number treated	....	....	....	....	....	....	....	....	125

* There were two failures after six treatments, making a total of four failures.

One of the failures involved the inner canthus. Two were morpheaform epitheliomas, and the fourth occurred in an area to which radium had been applied a year previously. The four failures and four recurrences were cured by desiccation. As some of the cures are only of from one to three years' standing, all of them may not be permanent. Of the 125 patients, all were finally cured; 39 were last treated in 1925 or before that year, 19 in 1926, 12 in 1927, 24 in 1928, 20 in 1929 and 11 in 1930.

Twenty-three patients with prickle cell epitheliomas were treated, with four or five exposures of from 1½ to 1¾ units, the initial dose being from 1¾ to 2 units, usually unfiltered; the interval was four weeks. Only the patients with the earliest and most superficial conditions were treated, with four exceptions. The diagnosis was not checked by biopsy. In five of the cases, involving the lower lip, there have been no recurrences. One of the patients was treated in 1925, one in 1926, two in 1927 and one in 1928. In three others with involvement of the lip who were apparently cured in 1929 and 1930, the cures are too recent to be judged. Of the remaining fifteen, twelve are known to have had recurrences and three have not been accounted for. Irradiation failed in one case of Paget's disease.

Two irritated melanotic moles were removed by deep and wide desiccation together with intensive irradiation, and the patients have apparently remained cured since 1928 and 1929, respectively. Probably the moles had not yet become malignant. One was on the forehead under the hat-band, and the other was on the outer aspect of the arm. Two others, which had become inflamed and crusted and were enlarging, did not end so favorably after similar treatment. My attitude is pessimistic regarding the treatment for melanomas.

Dermatitis herpetiformis responded favorably to irradiation. Eight patients were thus treated, and three were cured with one course (one cure being aided by sodium cacodylate, from 3 to 5 grains [0.195 to 0.324 Gm.] intramuscularly, twice a week). Two were relieved and discontinued treatment, and the remaining three had one recurrence which cleared up again readily. In two of the cases in which a recurrence took place, sodium cacodylate or solution of potassium arsenite had been used during the first course. The average number of roentgen treatments required for a course was 13.2.

TABLE 10.—*Results in the Treatment for Herpes Simplex and Herpes Progenitalis*

Five Patients Treated	Duration	Location	Number of Treatments	Dosage	Comment
Two cured	2 years	Glans penis	5	¼ unit	Old gonorrhea treated
	6 years	Ala nasi	8	¼ unit	
Two relieved.	6 years	Penis	4	¼ and ⅛ unit	
	4 years	Cheek	5	¼ unit	Outbreaks milder and much less frequent than formerly
			Recurred, then 2	½ unit	
One failure	4 years	Buttock	5	½ unit	

Patients with persistently recurring herpes simplex and herpes progenitalis were treated with some apparent success, as table 10 indicates.

Of 208 patients with pityriasis rosea, 26 were treated fractionally with roentgen rays. These were the most severe and stubborn cases, and were usually pruritic. There was often a complicating seborrheic dermatitis. From one to four one-fourth unit doses were needed, and although the results seemed favorable, it would be difficult to prove that the eruption did not subside spontaneously. Mild ointments were also used throughout the course of treatment.

One case is particularly instructive: A man, aged 43, presented a medium coin-sized, sharply outlined, erythematosequamous patch on the abdomen, which was considered probably to be tinea corporis. This impression was not confirmed by the laboratory, but a mild ointment of thymol was ordered and one-fourth unit dose of roentgen rays administered. Within a week, a typical eruption of pityriasis rosea appeared, and three fractional treatments (one every week) were applied to the worst areas. The eruption faded in two weeks. The total course was nine weeks, from the first appearance of the herald patch. It is said an erythema dose of ultraviolet rays is effective in shortening the course of pityriasis rosea, but I have not tried to confirm this.

A patient with dermatitis dysmenorrheica on the cheek, of 2½ years' duration, had not had a recurrence after six one-half unit doses given in 1924. A case of lymphangiectodes in the axilla responded to four treatments of 1½ units each, and there had been no recurrence in five years. Ten one-eighth unit treatments, at weekly intervals, cleared up a case of lingua geographica, and fourteen one-eighth unit doses were sufficient in a case of cheilitis glandularis. A patient granulosis rubra nasi was cured after four one-fourth unit exposures, and there have been no recurrences. Cheilitis exfoliativa and lichen spinulosis did not respond well. Two patients with granuloma fungoides and one with Hodgkin's disease with cutaneous nodules were helped temporarily; the latter patient discontinued treatment when improved, and could not be followed up.

Comment.—The great value of roentgen rays in dermatology is apparent in the foregoing summary. It is probably now the method of first choice, when employed intensively, for the destruction of basal cell epitheliomas, occasionally aided by electrodesiccation. It is a necessity in the treatment for keloid.

It also appears to be the best form of treatment, when used fractionally, in pruritic conditions, including localized neurodermatitis or lichenification, selected cases of stubborn pruritus cutaneous and pruritus ani, vulvae or scrotalis, in combination with mild, antipruritic inunctions. Also in dermatitis herpetiformis and lichen planus it seems to be the most advantageous type of therapy. In severe and generalized lichen planus, semi-intensive spinal irradiation seems to hasten the cure, but simultaneous fractional treatment for the worst areas appears to be an added help.

In seborrheic dermatitis, acne vulgaris and rosacea, fractional irradiation seems to accomplish a quicker cure in a larger percentage of cases than any other method of treatment, but in order to facilitate the cure, suitable strict dietary regulations, together with proper remedies for the scalp and skin, must be used at the same time. The general health must also receive attention.

In the treatment for psoriasis, it is also probably the most effective single agent, but

TABLE 11.—*Summary of Results in Principal Conditions in Which Patients Were Treated by Means of Roentgen Rays*

Diagnosis	Number Completing Treatment	Number Cured with One Course	Number Recurring	Number of Failures
1. Acne vulgaris	399	335 (84.0%)	59 (14.7%)	5 (1.2%)
2. Rosacea	83	72 (85.5%)	4 (4.8%)	8 (9.6%)
3. Dermatophytosis	513	369 (71.9%)	104 (20.2%)	40 (7.7%)
4. Local neurodermatitis	71	56 (78.7%)	15 (21.2%)	0
5. Lichenification	148	124 (83.7%)	24 (16.3%)	0
6. Generalized neurodermatitis	11	0	7 (63.7%)	4 (36.3%)
7. Seborrheic dermatitis	328	258 (78.6%)	64 (19.4%)	6 (1.8%)
8. Psoriasis	237	109 (58.9%)	68 (36.7%)	8 (4.3%)
9. Lichen planus	44	39 (88.6%)	3 (6.9%)	2 (4.5%)
10. Pruritus cutaneous	6	6 (100.0%)	0	0
11. Pruritus ani, vulvae and scrotalis	104	85 (81.7%)	19 (18.3%)	0
12. Verruca vulgaris	22	6 (27.2%)	0	16 (72.8%)
Verruca juvenilis	24	5 (20.8%)	0	19 (79.2%)
Verruca filiformis	4	0	1 (25.0%)	3 (75.0%)
Verruca plantaris	20	10 (50.0%)	0	10 (50.0%)
13. Senile or seborrheic keratoses	45	44 (97.7%)	0	1 (2.3%)
14. Epithelioma, basal cell, x-rays alone	110	103 (93.6%)	3 (2.9%)	4 (3.8%)
Epithelioma, basal cell, x-rays plus desiccation	15	14 (93.3%)	1 (6.7%)	0
15. Epithelioma, prickle cell	23	5 (21.7%)	.....	18 (78.3%)
16. Dermatitis herpetiformis	8	3 to 5 (37.5 to 62.5%)	3 (37.5%)	0

owing to the high percentage of recurrences it must be employed with extreme care, and possibly left for use as a method of last resort, while other forms of treatment are employed more as a routine. The same statement applies to the troublesome cases of generalized neurodermatitis, in which, fortunately, there is always a chance that the cause may be found and removed.

Patients with stubborn cases of eczematoid dermatophytosis usually seem to derive the greatest benefit from fractional irradiation. It should be used with care in selected cases, always with suitable mild antipruritic and parasiticidal applications.

In pityriasis rosea, fractional treatment seemed to shorten the course of the more severe cases, but this impression must be confirmed by further observations. In sycosis vulgaris, its use was abandoned for more effective local antiseptic measures.

In the treatment for all types of warts, irradiation appears to be greatly inferior to electrodesiccation. Plantar warts may be a possible exception, but the recorded percentage of cures is not encouraging.

Senile or seborrheic keratoses respond well to irradiation, but this method of treatment seems a little inferior to desiccation, which is quicker and produces satisfactory end-results.

For the destruction of prickle cell epitheliomas, intensive irradiation, as I employ it, seems suitable only in a certain number of the earliest and most superficial cases with involvement of the lip. In most cases, wide excision, radium implants, deep irradiation or combinations of these offer more hope of effecting a permanent cure.

The pitfalls in the use of roentgen rays seem to lie chiefly in placing too great reliance in this method of treatment alone, and in the continued irradiation of recurrences in the same area. In conditions which benefit by other forms of treatment, such as diets and various local applications, these aids should be employed to their full extent, to supplement the action of the rays and to help effect a cure with a minimum amount of irradiation. Furthermore, it appears that most of the recurrences of the pruritides, acne vulgaris, rosacea, seborrheic dermatitis and dermatophytosis might be prevented by the routine instruction of every patient regarding preventive care after the course of treatment has been completed, and by impressing the patient with its importance. The pruritides may often be warded off by continued proper bathing, followed, if necessary, by bland, protective inunctions and the immediate use of antipruritic ointments when required. Many recurrences of dermatophytosis could, no doubt, be prevented by the continued use of mild local parasiticidal applications, at least every night, in order to destroy any persisting infection and

prevent reinfection; however, overtreatment with irritating applications is to be avoided. It seems likely that many recurrences of acne vulgaris, rosacea and seborrheic dermatitis could be avoided easily by insisting on continued adherence to a suitable diet and uninterrupted care of the scalp. A complete physical examination is always desirable. Recurrences of neurodermatitis, local or general, and lichenification may often be prevented by the removal of possible causative factors, and by the instruction of the patient in the immediate use of suitable antipruritic ointments at the first sign of returning pruritus. Since one cannot prevent recurrences of lichens planus and psoriasis, and also certain recurrences of neurodermatitis and other conditions, one must use one's therapeutic versatility in dealing with them, and avoid excesses of irradiation. The roentgen rays probably constitute the most valuable curative agent in dermatology, but they must not be used to excess, and one must not expect too much of them.

Treatment by Means of Electrodesiccation

Eleven patients with granuloma pyogenicum were treated, and all were cured by one application of the needle. There have been no recurrences.

Warts of all types were removed successfully by desiccation, including 153 on the hands and fingers and 184 on the face, neck and scalp. In dealing with verrucae barbae, two or more crops of new lesions had to be removed in 40 per cent of the cases. In sixteen cases plantar warts were dessicated (four of these also presenting verrucae vulgares on the hands). Two, on the soles, had resisted 2, 2⅛ and 2¼ skin units of unfiltered roentgen rays. Desiccation had to be repeated once in one case. Deep destruction is necessary to prevent recurrence, and after the operation the pain is usually relieved rather than aggravated.

Eight patients with molluscum contagiosum were treated by desiccation. Lesions were found on the upper eyelids, face, neck, arms and trunk, and they were sometimes numerous. One treatment sufficed, and there was no recurrence.

Pale fibrous nevi were removed satisfactorily in ninety-two cases, raised pigmented nevi in fifty-one flat pigmented nevi in six, hairy nevi in four and pigmented hairy nevi in seven. The eyelids were involved twice, the face one hundred and twenty-five times, the neck thirty-seven, the axillae ten, the trunk thirteen, the arm seven, the groin once, the scalp twice and the hand once. In eight instances a second application was necessary. The results were entirely satisfactory to the patients.

Five patients with verrucose nevi were treated. Two of the nevi, which were of medium and large coin size, were destroyed with apparently good results, but in the remaining three, located on the cheek and above and behind the ear, a troublesome and persistent tendency to regrowth was noted. Therefore, in this type of nevus the results were only about 40 per cent satisfactory. Unfortunately, the effects of intensive roentgen irradiation were not tested in this type of recurrence, but they might prove valuable.

In thirty cases a nevus araneus was removed from the face. Eight nevi were removed from children, aged from 5 to 13 years, and twenty-two from patients from 15 to 58 years of age. Some of the nevi may have been of traumatic origin. All responded well, and few required a second treatment. The central blood vessel was destroyed.

So-called senile angioma of the lower lip was removed in one treatment in seven cases, without recurrence. In one of these cases radium had been ineffective. In fourteen patients with disfiguring senile telangiectases on the face, the largest vessels were destroyed, to the satisfaction of the patients. In five cases of chronic radiodermatitis, the more prominent telangiectases were removed, with considerable resultant cosmetic improvement.

Three small and medium coin-sized cavernous angiomas were removed: one from the tip of the nose, one from the nostril and one from the leg. The results were excellent, and the scarring was not objectionable. This method of treatment seems advisable, at least when response to radium is not prompt.

The senile and seborrheic keratoses were not differentiated. Desiccation was used in 123 cases, the eyelids, ears, all parts of the face, scalp, trunk, arms and hands being involved. The results were uniformly good

after a single treatment, which was much more rapidly effective than roentgen irradiation and at least as satisfactory to the patients. In five cases cutaneous horns were removed. All were located on the cheek, and in two with infiltrated bases three intensive roentgen exposures (1½ skin units) were given after the keratosis had been removed. No recurrence was observed.

Only two patients with leukoplakia received this treatment. One case was extensive. Both of the patients did well.

Two men presented large numbers of arsenical keratoses, and there were several painful ones about the heels. These lesions, and also several on the hands, were removed. The good results have been lasting.

Desiccation was used in thirty-three cases of basal cell epithelioma, usually together with roentgen rays, and ordinarily at the second or third irradiation, as a means of hastening beneficial results. In nine cases it was used in the same manner as a curet, on elevated, verrucous or nodular tumors before irradiation was begun. Eight of the patients were cured, and the ninth stopped treatment after two irradiations, improved. In some cases, of course, treatment was given for several epitheliomas; seven about the ear or scalp were desiccated without irradiation. All of the patients were cured, but some had been treated too recently for the permanency of the results to be judged. In seven cases, in which recurrence had followed roentgen treatments, and in another in which there had been a recurrence after the application of radium, desiccation was successful.

Only two patients with prickle cell epitheliomas were treated with the needle, together with roentgen rays. One tumor, which was extensive on the inside of the cheek, was electrocoagulated and intensively cross-fired by roentgen and radium irradiation, but failed to respond. The other, which was slightly infiltrated, on the lower lip, was desiccated once and received four intensive irradiations. The patient has remained cured since 1928.

Twenty-two sebaceous cysts, of small and medium size, were desiccated, and one treatment was successful in all cases. Two had been incised previously, and had been treated with caustic applications. Five pea-sized mucous cysts of the labial and buccal mucosa were removed in one application.

Other conditions in which a single application was effective include: one hydrocystoma, with many small tumors, great improvement after two sittings; one multiple benign cystic epithelioma; three cases of xanthelasma; one painful nodule of the ear; one case of probable nonpainful nodule of the ear (Klauder); two synovial lesions of the skin; two cases of periadenitis chronica mucosae recurrens; one case of lupus vulgaris with small scattered nodules, and one case of lupus vulgaris of widespread superficial type, with central scarring and an active, ulcerative margin. In the last case, the patient was treated with apparent success in 1922 and has not been observed for several years, so that the condition may have recurred. In one case, several lesions of Boeck's sarcoid were removed by desiccation, and have not recurred. A patch of lupus erythematosus on the lip and one on the cheek, in the same patient, disappeared after desiccation, but in two other cases small, isolated discoid lesions were given from two to three treatments and recurred.

Desiccation aided in the removal of the two melanotic moles, as described under the heading of roentgen treatment. In a case of endothelioma, developing in a brown nevus on the abdomen, deep, wide electrocoagulation plus intensive roentgen exposures proved ineffective, and metastases ensued.

In two stubborn cases of psoriasis, a few of the lesions were desiccated, without benefit.

Keloid followed desiccation in two cases. The first was the case of widespread superficial lupus vulgaris, occurring in a Negro, previously described. In this case, keloid formation was evident within a month after the treatment, and it disappeared after four 1 unit doses of roentgen rays, at intervals of a month. Four irradiations were also required in the case of a girl from whose chin a small fibrous mole had been removed a month previously. It is better to explain this possibility to the patient before using desiccation. The results after irradiation are good, as in the case of most keloids. Aside from these two cases, there was no objectionable scarring, and the patients were well pleased with the results.

Summary and Comment.—Desiccation appears to be the method of choice for the removal of all types of warts, including plantar warts. In the latter, irradiation may be tried first, if preferred, but one desiccation, if sufficiently deep, usually removes the wart, and is followed by very little discomfort. Warts may be removed from the face and neck with excellent cosmetic results. The same statement applies to fibrous nevi, but verrucose nevi may recur.

There seems to be no better way of removing nevi araneus, telangiectases and senile angiomas; cavernous angiomas may also be removed by this means, more quickly and perhaps better than with radium. Of course, this statement does not apply to the cases that respond to radium at once, which fade without pronounced atrophy.

Senile and seborrheic keratoses, cutaneous horns and arsenical keratoses can usually be completely removed by one desiccation, but if there is any suggestion of beginning malignancy, this treatment should be supplemented by roentgen irradiation.

Sebaceous and mucous cysts are rapidly and effectively removed by this method.

It is a quick and effective means of removing xanthelasma and granuloma pyogenicum.

It may also be employed for the removal of basal cell epitheliomas, but in such cases it should be combined with roentgen irradiation, in order to insure the destruction of any outlying cancer cells. This applies also to the treatment for prickle cell epitheliomas.

Desiccation has been a valuable addition to the armamentarium, probably standing second to the roentgen rays.

Treatment by Means of Electrolysis

The value of electrolysis for the removal of hair was demonstrated in thirty-nine cases of hypertrichosis and seventeen hairy nevi. Eleven of the nevi were also fibrous or verrucose; trichloracetic acid was applied to three and desiccation to eight.

Desiccation was found to be quicker and better than electrolysis for the removal of fibrous nevi, six of which were treated by electrolysis, one twice. Two patients with nevi araneus were treated; in one a recurrence took place. Desiccation seemed preferable in this condition, as well as in the treatment for facial telangiectases, filiform warts and verrucae vulgaris. Three patients with facial telangiectases, four with common warts and five with filiform warts were treated by electrolysis, but this method was discarded because there was a tendency for the electrolytic needle to leave linear scars, and second treatments were often needed.

Conclusion.—Electrolysis is recommended as the best procedure for the permanent removal of hair, but in the other conditions mentioned it seems to be second to desiccation.

Treatment by Means of Radium

Fifteen patients with cavernous hemangiomas were treated with a half-strength flat radium plaque, containing 10 mg. of radium. Thirteen of the patients were infants, and two adults. All of the lesions were superficial, and semi-intensive treatment was given, at intervals of about two weeks with thin aluminum filters and a rubber dam, applied directly to the skin. An average of ten treatments was needed, although in two patients the tumors disappeared after the first exposure. More or less atrophy and telangiectasia followed in most of the cases, and therefore I prefer the quicker method of electrodesiccation, which usually leaves an acceptable scar and no undesired sequelae. Radium failed in one of the adults, and desiccation was then used effectively. Possibly better and quicker results might have been obtained by a different technic, but atrophy would probably not have been avoided.

Three patients with senile angiomas of the lower lip were treated with radium, semi-intensively. In one case, four exposures were effective, but in the other two desiccation had to be used because radium failed.

Likewise, desiccation was found to be preferable in the treatment for leukoplakia. This does not include cases in which there is beginning formation of epitheliomas.

The value of radium in the treatment for prickle cell epithelioma is recognized, but my small flat applicator was not considered suitable for that purpose. Patients with such cases, presenting any considerable infiltration, even with no involvement of the palpable lymph nodes, were sent to a radiologist, who has treated a number of them effectively.

On account of the greater accuracy of dosage measurement and the greater speed and convenience of application, roentgen rays have always been preferred in the treatment for accessible epitheliomas.

Summary and Conclusion.—A 10 mg. half-strength flat applicator of radium was found useful in the treatment for cavernous angiomas, especially in infants. In many cases desiccation is at least of equal value.

Treatment by Means of Ultraviolet Rays (Kromayer Lamp)

Twenty-nine patients with alopecia areata and one with a recurrent case after two years were treated. Four discontinued treatment, unimproved, after the first or second application. Exposures were usually given from every ten to fourteen days, with the lamp at a distance of 6 or 8 inches (15.24 or 20.32 cm.) from the scalp, an erythema dose being administered, producing some vesiculation at times. Only patients with stubborn cases were treated in this manner, always in conjunction with the use of stimulating lotions, frequent shampooing and massage twice daily. When the erythema was severe, of course, these measures were temporarily suspended.

Two patients were not benefited by three and seven applications. Two cases of ten and twelve years' duration required twenty-seven months for complete regrowth, during which time the ultraviolet applications were alternated with applications of phenol and alcohol. One of nine years' duration showed improvement after two weeks, and one of eighteen years' duration improved in a month. In a case of six years' duration, four and one-half months of treatment were ineffective. Cases of shorter duration showed regrowth, on the average, after ten weeks of treatment, and it seems possible that the added irritation furnished by the sunburn accelerated regrowth somewhat.

Fifteen patients with premature or seborrheic alopecia were similarly treated. Five discontinued treatment in a week or two. Four were not benefited by several weeks' treatment, four were slightly improved, and four were considered as improved after from two or fourteen months. ("Improvement" means the checking of the loss of hair. I have never observed an increased growth of normal hair in this type of case. The growth of lanugo hair has sometimes appeared to be stimulated.)

Five patients with nevus flammeus were treated by exposure to the lamp under pressure with a quartz applicator in doses sufficient to produce vesiculation. Three showed some improvement following several such exposures, and the other two, whose lesions were extensive, derived great benefit from two or three years of intermittent treatment. The improvement has been lasting. Although the affected areas faded greatly under treatment, the last traces of the condition have never completely disappeared. The same may be said for this treatment in radiodermatitis. One patient was treated nine times without benefit.

One case of tuberculosis verrucosa cutis, which had resisted 9 units of roentgen rays, cleared up after nine treatments with the Kromayer lamp. Two patients with lupus vulgaris were not improved after many intensive treatments under pressure, and one patient with perianal tuberculosis cutis failed to improve after thirty-two exposures, even with the aid of constitutional treatment.

Before the introduction of better treatment, six patients with discoid lupus erythematosus were treated by the lamp under pressure. Three were apparently cured, but in one a recurrence had appeared within a year; the recurrence disappeared after four weeks of treatment with the Kromayer lamp. A fourth patient showed improvement, and in the remaining two, treatment was without effect.

Ultraviolet light was of some apparent benefit in an old case of erythema induratum, and in a stubborn case of ecthyma. Small ulcers in areas of chronic radiodermatitis were healed in from two to six months. A palm-sized ulcer, which had developed in a patch of scleroderma, failed to clear up under treatment, even with the use of desiccation.

Since no air-cooled lamp was used, it cannot be considered in this report, although its value in the treatment for psoriasis, pityriasis, rosea, etc., is conceded.

Summary and Comment.—The Kromayer lamp, probably acting as a source of irritation, was apparently beneficial in some cases of alopecia areata, and in the treatment for

sluggish ulcers. As a rule, one may easily dispense with its use. It may occasionally be of value in cases of lupus erythematosus that resist more modern therapy. Considerable improvement, but probably no complete cures, may be produced by its prolonged use, under pressure, in cases of nevus flammeus.

General Summary and Conclusions

A series of 7,206 cases, constituting my private dermatologic practice for more than nine years, is analyzed with regard to the effectiveness of treatment with roentgen rays, radium, ultraviolet rays, electrolysis and electrodesiccation. In this series, 3,541 patients received at least one of these forms of therapy.

In each condition of the skin treated by one of the foregoing methods, the number and percentage of cures, recurrences and failures are recorded.

While the roentgen rays are probably the most valuable single therapeutic agent in dermatology, too much reliance must not be placed on their use alone, and they must not be used excessively. It is recommended that their effectiveness be reinforced by the simultaneous employment of any other measures that may be of value, provided they are not too irritating. Recurrences of many conditions of the skin may often be prevented if the patient follows certain precautions in the care of the skin or scalp, and often in the diet. Such prevention is better than too many roentgen treatments. Unpreventable recurrences must be handled cautiously, and other applications should be substituted for the roentgen rays when possible.

Electrodesiccation is considered another valuable method of treatment, and the one that seems most suitable for the removal of warts, moles, keratoses, leukoplakia, telangiectases, molluscum contagiosum, granuloma pyogenicum, xanthelasma and a number of other conditions, and at least a valuable aid to irradiation in the treatment of epitheliomas.

Electrolysis was found to be the best procedure for the permanent removal of hair. For other purposes desiccation was preferred.

Radium is judged only partially, with regard to the effectiveness of a 10 mg. half-strength flat applicator, which was not employed extensively. It was found useful for removing cavernous angiomas, but in many such cases electrodesiccation was considered possibly the method of choice.

Ultraviolet rays, as produced by a water-cooled mercury arc lamp, were found to be of uncertain value as a local irritant in cases of alopecia areata and apparently helpful in the healing of certain sluggish ulcers. They were somewhat beneficial when applied under pressure to nevus flammeus, but were never completely effective, even after long periods of treatment. The air-cooled lamp was not used, and its possible value is therefore not considered.

Abstract of Discussion

Dr. Howard Fox (New York): The speaker did well to obtain clinical cures in acne with an average of thirteen weekly treatments. In rosacea 85 per cent of good results is very high from any combination of methods. I think that a large proportion of such results were mainly due to the other methods employed, such as diet, hygiene, etc. Rosacea certainly does not respond to the roentgen rays nearly as well as does acne. As to sycosis, the author does not seem favorable to roentgen rays, though he speaks of its value in 40 per cent of the cases, a high proportion in my opinion. I would like to know how he can cure twelve of fifteen patients by any known method. Tinea capitis in New York does not respond satisfactorily to any agent except the roentgen rays. Why patients can be successfully treated by salves in the Middle West and not in the East I have never understood. The speaker's results in seborrheic eczema were unusually favorable, even considering the 19.4 per cent of recurrences. In psoriasis I use the roentgen rays for lesions of the scalp as a routine measure, followed by local applications. I agree entirely with Dr. Parkhurst's remarks about the necessity of extreme caution in treating patients with psoriasis, on account of frequent recurrences and the danger of cumulative dosage. I also agree with his remarks about the curative value in lichen planus and palliative aid in pruritus ani et vulvae. My experience with both common and plantar warts would parallel the speaker's, though possibly a little more than 50 per cent might be permanently cured, especially by repeating the treatment once or twice. In the treatment for basal cell epithelioma following removal by endothermy or curet, I personally give a dose of 3 skin units of unfiltered rays as opposed to the 1½ or 2 units of the speaker. In only one case have I noticed any resulting telangiectasia, and that was rather insignificant. I was interested to hear of roentgen treatment for lingua geographica, as I believe I was the first to use this method, Dr. Ormsby being the first to use radium in this disease.

I agree in general with Dr. Parkhurst's remarks about the use of electrodesiccation. I think, howver, that better cosmetic results can be obtained in extensive pigmented and hairy moles by carbon dioxide snow, while in small elevated nonhairy moles I think that the electric cautery is without a rival. As to ultraviolet therapy, I also think that one can easily dispense with the Kromayer lamp, but not the air-cooled type. This agent, I think, is of distinct value in a number of dermatoses, though its action must be considered, as Erwin Zeisler said, mainly as an adjuvant to other therapeutic methods. As to radium, I think that its place is extremely limited for the dermatologist, and with a very few exceptions it should be used only by those whose entire time is devoted to this method of treatment.

Dr. William A. Pusey (Chicago): Nearly every time I hear a description of what can be done by electrodesiccation I think of how easily we can do the same with the electric cautery. A desiccation apparatus is rather expensive and cumbersome, but an electric cautery is cheap and easy to use, and I recommend, with a good deal of feeling of interest in you, that you cultivate more the electrocautery. I entirely disagree with the remark of Dr. Fox, that radium should not be used by the dermatologists but left to those who specialize in its use. I do not know of anything that is better in the treatment for small areas than a radium plaque. For example, I have a small keratosis on my hand, and if we met three weeks from now I would show you the excellent result secured by radium, and no bad effects. I think that there is no difference in the biologic effects between radium and the roentgen rays. I cannot see why you should have 300 or 400 mg. of radium and screen out most of it, and leave the work to those who know radium and not skin diseases. Radium for me is a remedy to be used after expert diagnosis. A small piece of radium that a man can apply to clear up these conditions is excellent. There is no reason why a dermatologist with thirty minutes of training should not know how to use a small radium plaque.

Dr. Samuel Ayres, Jr. (Los Angeles): In regard to keloid formation following the treatment for moles, I think that this can be largely obviated and a better result obtained by using the fractional desiccation, just lightly brushing the spark over the mole, and repeating it in two or three weeks. Within a short time the mole melts away, and I have never seen a cosmetic result that I have been ashamed of.

In the treatment for keloid, I have always thought that the fractional dose is just as effective as the large dose, without the danger of telangiectasia. I favor the use of deep coagulation or an endotherm knife rather than desiccation for the melanotic moles.

In regard to plantar warts, I think that we can obtain 100 per cent good results by preliminary peeling down with strong salicylated collodion. Following this the use of a half strength plaque of radium, unfiltered, for one hour gives admirable results with no disability to the patient. This may have to be repeated several times, but I have yet to see a case that could not be relieved in this way. I fully agree with Dr. Pusey in regard to the use of radium by the dermatologist.

In the matter of ultraviolet rays, there is a new modification of the air-cooled light that has recently been put on the market in the West, which I think will be time saving. It is called "cold quartz." It does not heat up and can be brought to within 1 or 2 inches (2.5 or 5 cm.) of the skin. It is possible to treat a whole body area with a good erythema dose in one and one-half minutes, which is time saving.

In regard to tinea capitis, I think that in the West the majority of physicians do not use roentgen therapy. I do not know whether it is because Microsporon lanosum is our predominant organism, but I think that with careful asepsis of combs, brushes and hats practically all cases can be relieved in from six to eight weeks without roentgen therapy, by the use of forceps epilation, iodine, 10 per cent ammoniated mercury ointment, Whitfield's ointment, etc.

Dr. Bedford Shelmire (Dallas, Texas): I would like to add tattoo marks to the list of conditions that may be successfully treated with electrodesiccation. After trying many methods for the removal of these pigmentations, desiccation has been found quicker, more convenient and accompanied by better cosmetic results in all except the smaller lesions, which can be excised surgically.

The area of the tattoo, under local anesthesia, is lightly desiccated. The skin overlying the tattoo pigment is then easily removed with a hollow curet, exposing the bright pigments of the mark. Much of this pigment can then be removed by the curet. The area is repeatedly very lightly desiccated and curetted until all the pigment is removed. The resultant scars after healing of such lesions approximate those obtained after removal of tattoo marks by other methods. I have observed no special tendency toward keloid formation.

Dr. Fred Wise (New York): I think that Dr. Parkhurst is to be congratulated not only on the work he described in his paper, but on the excellent results he has obtained with relatively small amounts of radiation therapy.

I must say that my results in the treatment for acne, and especially rosacea, have never been anything to brag about, either in my own opinion or in that of the patients. I have never been able to cure patients with severe cases of acne with the small amounts of roentgen therapy Dr. Parkhurst has mentioned, and when it comes to rosacea I still do not know whether radiation is good treatment or bad. I have many cases in which roentgen therapy seems to help, but a great many of the patients must be treated constitutionally, over prolonged periods, as everyone knows.

In other diseases, for example mycosis fungoides, which we could not even palliate before the

discovery of the roentgen rays, there are cases that respond like magic to this treatment, and there are others that do not respond at all. We found that the histologic changes in the lesions of the ones that respond favorably differ from those in the ones that do not respond well to roentgen therapy. In one case the infiltration in the corium consisted of plasma cells almost exclusively, and although the eruption was mycosis fungoides clinically, roentgen therapy not only had not helped the patient but had made the eruption worse. That is a disappointment in connection with roentgen therapy in the treatment for a disease in which we have depended on it to bring about remissions or even cures. The same applies to certain cases of Kaposi's sarcoma. We have learned that patients with eruptions of Kaposi's sarcoma who are treated with filtered roentgen therapy usually are benefited. We have a patient under treatment for whom long-continued, superficial roentgen therapy was of no avail. The disease continued to progress, and we then instituted deep roentgen therapy with 3 mm. of aluminum, but the results have been poor and the condition has progressed despite all our efforts.

With regard to other diseases, it must be left to one's judgment whether to employ carbon dioxide snow, desiccation or other surgical measures. The possible cosmetic results, such as scarring and the production of keloids, must always be borne in mind.

In the treatment for common warts with the roentgen rays, my results have been unsatisfactory on the whole, and I have resorted to carbon dioxide snow, desiccation, curettage and so forth.

With regard to xanthelasma, I believe that subjecting the eyelids to injections of procaine hydrochloride, ablation and stitching is not a good practice. I think that the best treatment consists of applications of trichloracetic acid, 50 per cent solution, with long intervals between treatments. This produces no ectropion or visible scarring, and the end-results are better than can be accomplished by any other treatment I know of.

Dr. William A. Pusey (Chicago): I should like to say one thing about the treatment for xanthoma of the eyelid. It seems to me that it is impossible to find a better treatment than punctate cauterization. If superficial punctate cauterization is done almost as close as dots can be made with a pin point, a clean scar and a perfect result will be obtained, except for a lack of pigment in the area.

Concerning the point of keloids resulting from desiccation with the cautery and trichloracetic acid, I do not know whether it is the general practice, but why should we not apply radium plaques to these scars early? In my experience, they can be melted down by a moderate dose of radium.

Dr. Charles M. Williams (New York): In the treatment for xanthoma, desiccation has given me the best results. With a fine needle one can lift up the skin of the eyelid so as not to go deep, and then one can make the treatment as superficial as one likes. Within a week or two one would hardly know there was any scarring, and the disease is gone. I have known them to recur, but the cosmetic result is good. I have never used procaine hydrochloride on the eyelid.

Dr. Charles C. Dennie (Kansas City, Mo.): I think that xanthoma will recur no matter what treatment is used, and the most simple treatment I know of is equal parts of trichloracetic acid, 95 per cent carbolic acid and alcohol. The lesions are painted with this mixture; they will turn white and peel off, and the xanthoma is gone.

Dr. William H. Guy (Pittsburgh): I think that in xanthelasma careful surgical excision as an office procedure is the method of choice. It has been my practice to excise these lesions, and I see no objection to using procaine hydrochloride. With a fine knife make an incision parallel to the lines of cleavage, carefully dissect out the lesion, and after the bleeding has stopped and every evidence of the lesion has been removed, bring the edges together with horse hair. I have never failed to secure primary union. Only seven days with a small dressing is required. A month later it is difficult to make out the line of incision.

Dr. Howard J. Parkhurst (Toledo): I appreciate this generous discussion. Replying to the point Dr. Fox and Dr. Wise brought up regarding the almost too good results obtained in the treatment for acne and rosacea, those results were, as they guessed, due to strong insistence on proper dietary and hygienic measures, and constitutional treatment when indicated.

Regarding the efficacy of irradiation in sycosis, my results were not even 40 per cent good, as I stated in the paper, and I thought that I could obtain better resuls by the use of suitable ointments locally.

Regarding the irradiation of tinea capitis, as Dr. Ayres stated, and as is well known in our part of the country, irradiation is seldom if ever required and I have never had to fall back on it.

The dosage I used in the treatment for epitheliomas was rather small, but I found it successful in a very large percentage of basal cell epitheliomas, with slight atrophy ensuing.

I was interested in Dr. Wise's statement regarding the histologic picture of mycosis fungoides. I have had experience in only two or three cases of that disorder, which apparently responded well.

Regarding the use of the cautery in the treatment for warts and moles, as suggested by Dr. Pusey and Dr. Fox, I agree with them, but I have made a habit of using electrodesiccation and find it successful in my hands.

In xanthoma, the lesions can be removed with slight amount of pain by desiccation, without an anesthetic. The same is true of other lesions on the eyelids.

As to my neglect of radium, I have been in the habit of using the roentgen rays, but I know radium is quite as valuable if one cares to use it. In treating keloids, I think that this measure is equivalent to roentgen therapy if one prefers it.

In regard to keloid following treatment, possi-

bly the same results can be obtained by fractional electrodesiccation, but I wish to call your attention to the fact that keloid occurred only twice in eight hundred and two cases.

I am interested in what Dr. Shelmire said about the use of light desiccation in the treatment for tattoo marks. I have not used it for that, but I have used it successfully in two cases of accidental tattooing following injury.

Regarding the value of trichloracetic acid and similar preparations in the removal of xanthelasma, I am in complete agreement with the discussers, but I thought that electrodesiccation was more efficacious and the results more rapid.

THE AUDIOMETER AS AN AID IN THE DIAGNOSIS OF IMPAIRED HEARING *

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CHICAGO

The scope of this paper is limited to the individual audiometer and has nothing to do with the use of group audiometers which would obviously not be pertinent under the title of this presentation, although the literature has been consulted and will be referred to, most of the statements are the author's own opinion based upon experience with this instrument over a period of several years.

The tuning fork has been found so valuable in the practice of otology that there is a tendency on the part of some very good ear surgeons to consider the advocacy of the use of a new instrument, such as the audiometer, as the profaning of a most valuable appliance in our work. I feel it incumbent on me to say that for a number of years I used a complete set of Bezold forks and whistles and still have the very highest regard for their value. However, the audiometer is an additional appliance which is exceedingly useful but which does not replace methods previously in use. This is not an uncommon situation in clinical medicine. For example, every laryngologist will admit the value of indirect laryngoscopy and uses it; on the other hand, no one will consider the advocacy of direct laryngoscopy as an indictment of the older procedure. It is simply an additional useful method in clinical medicine. In advocating the use of the audiometer I am not disparaging the value of the older standard methods, but am presenting it as an additional useful device in our practice.

I employ a Western Electric 2-A audiometer. The 2-9 audiometer produces eight pure tones ranging from 64 to 8,192 double vibrations per second in octave stops. To be explicit, the following pure tones are produced: 64 dv, 128 dv, 256 dv, 512 dv, 1,024 dv, 2,048 dv, 4,096 dv and 8,192 dv. It is possible to increase and decrease the intensity of each tone to the threshold of hearing of a patient and then record it on a graphic chart or audiogram. This chart may be filed as a permanent record of the individual's hearing at that time. Also, it is possible to figure the percentage loss of hearing. There is no doubt that the percentage loss of hearing as figured from the audiogram is not an accurate statement of the hearing loss but for practical purposes in practice it is a useful record. In this regard it is the same as many other findings in clinical medicine, i. e., subject to alteration when more work has been done. Only the regular telephone type of receiver was used. There is no question that this receiver gives a result which is a mixture of air and bone conduction. However, to my knowledge no method has been devised by which it is possible to eliminate bone conduction in the use of this apparatus. The bone conduction receiver is not considered as it has not been of material service in my hands. There is no doubt that there will be improvements on the present audiometer but in its present state of development it is a thoroughly practical device.

The audiometer may be considered an apparatus for both quantitative and qualitative examination. As a quantitative test it is of great value because it enables the otol-

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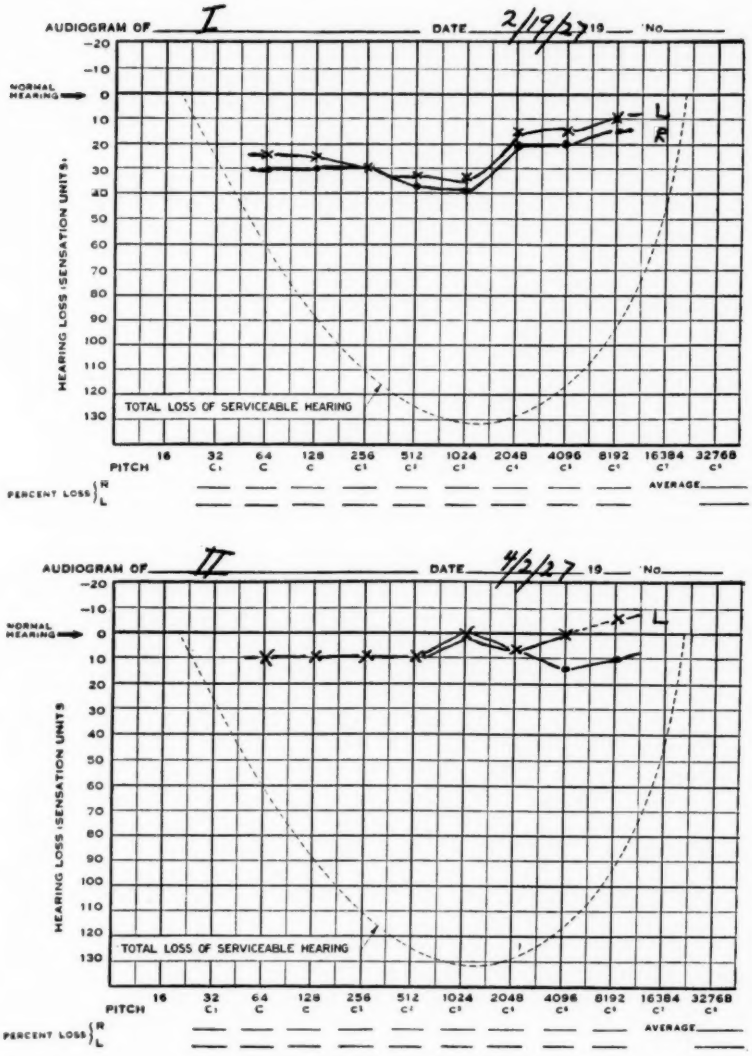
ogist to secure an accurate record of hearing which may be compared with other graphs made on the patient at any subsequent period. This is especially useful in watching the progress of a patient while under treatment. Without some such definite method one can never know with any degree of accuracy the progress which a patient is making under treatment. Previously we have depended upon the accoumeter, forced whisper and the spoken voice. However, these three methods are nothing like as accurate for this information as the repeated use of the audiometer. The striking of a tuning fork to produce a tone to the same intensity at different times is almost impossible and as a consequence the timing of the length of the hearing of a fork is quite inaccurate. As a result fine gradations can hardly be expected with tuning forks, while with an audiometer experience has demonstrated to me that it is possible to make repeated audiograms on individuals with very slight variations in the findings. Also, children give very accurate findings with this device. It takes an individual of considerable intelligence to so completely forget himself that he is able to say that the Weber is lateralized to the poorer ear. However, when it should be so lateralized, it is usually possible by explaining the function of the test to have him give an accurate finding. This difficulty does not exist in the use of the audiometer because an individual of quite limited intelligence can produce a satisfactory audiogram which will vary very slightly from day to day. Audiograms may be made by different examiners on the same patient with a slightest variation in findings. Parenthetically the audiometer is the only device by which different otologists may compare with a fair degree of accuracy findings on a given patient. It is my custom in the average conducting apparatus lesion to check the original audiogram with another made after four to six treatments.

In the use of the audiometer the same influences control diagnostic findings as in the use of forks and whistles, i. e., one finds a defect in the lower tones in conducting lesions and in the upper tones in perception lesions. The audiometer is by no means the best device for the production of low tones; however, in the middle and upper portion of the scale it is most valuable and this is especially true of the latter, it probably being the best method for the production of high tones. By the use of the audiometer or no other subjective test it is possible to make a diagnosis in the hearing defect without otherwise examining the patient. The use of the audiometer is only a portion of an examination of a patient and in no way relieves the otologist of the necessity of looking at his patient with care.

One must bear in mind in the interpretation of an audiogram the statement previously made that with the telephone type of receiver both bone and air conduction are factors to be considered. Bone conduction is superior in the conduction of low tones and is quite defective in the conduction of high tones which will frequently be observed when testing individuals with marked unilateral nerve deafness. The upper tones, especially the two highest, will frequently not be heard when the receiver is in contact with the poorer ear but will be distinctly heard when it is held away, i. e., it is heard by air conduction with the good ear. The audiometer has emphasized the common knowledge that syphilis is a common cause of nerve deafness. Many men have had this experience and I can verify the observations of Drury on the great importance of the drop in the upper tones, especially the 4,096 dv even with the recovery of the 8,192 dv in lues. However, frequently 8,196 is entirely ablated. The use of the audiometer because it so graphically portrays defects in the upper portion of the scale is exceedingly useful. A defect in the apparatus of perception in my opinion should indicate the same thorough physical search for a cause which would be instituted with any other nerve defect as for example, the finding of an optic neuritis or optic atrophy would cause one to look for a cause and the same thing is true with perception defects. It is so frequent to find in syphilis defects of the upper tones that defects in this portion of the scale should cause one to satisfy himself that his patient is not luetic. However, in defects of this type one should not be limited to the effort to find syphilis. He should try to find foci of infection or any other condition which is a frequent cause of nerve lesions.

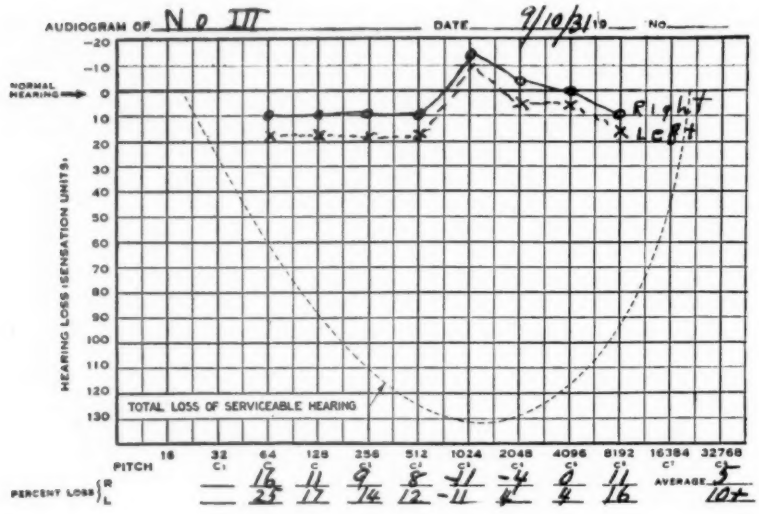
To facilitate this presentation a few audiograms will be shown. *Audiograms*: No.

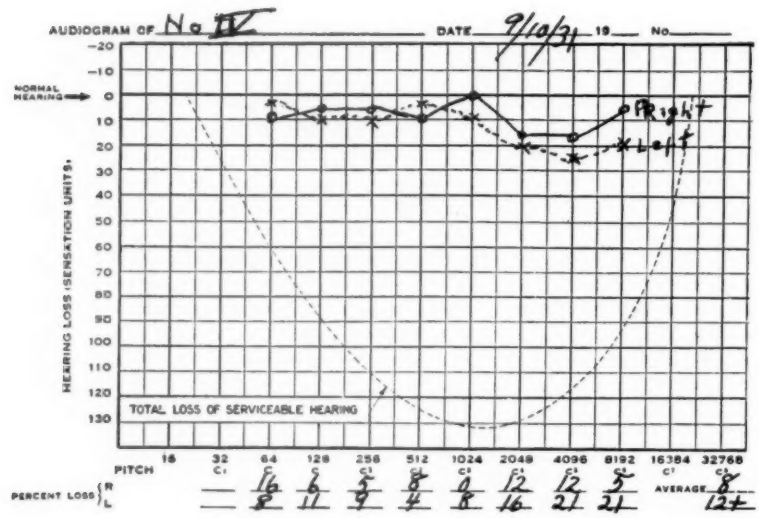


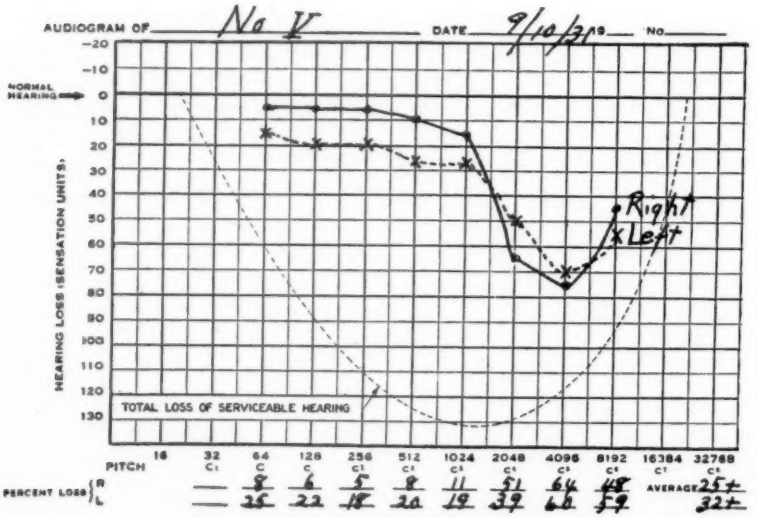
I and II are the audiograms on a young lady about seventeen years of age who complained of deafness. No. I shows a typical conduction apparatus defect. She was put under management and at the end of six weeks No. II was made which demonstrates that the diagnosis was correct and that treatment was effective. This demonstrates a point of great value in the use of the audiogram.

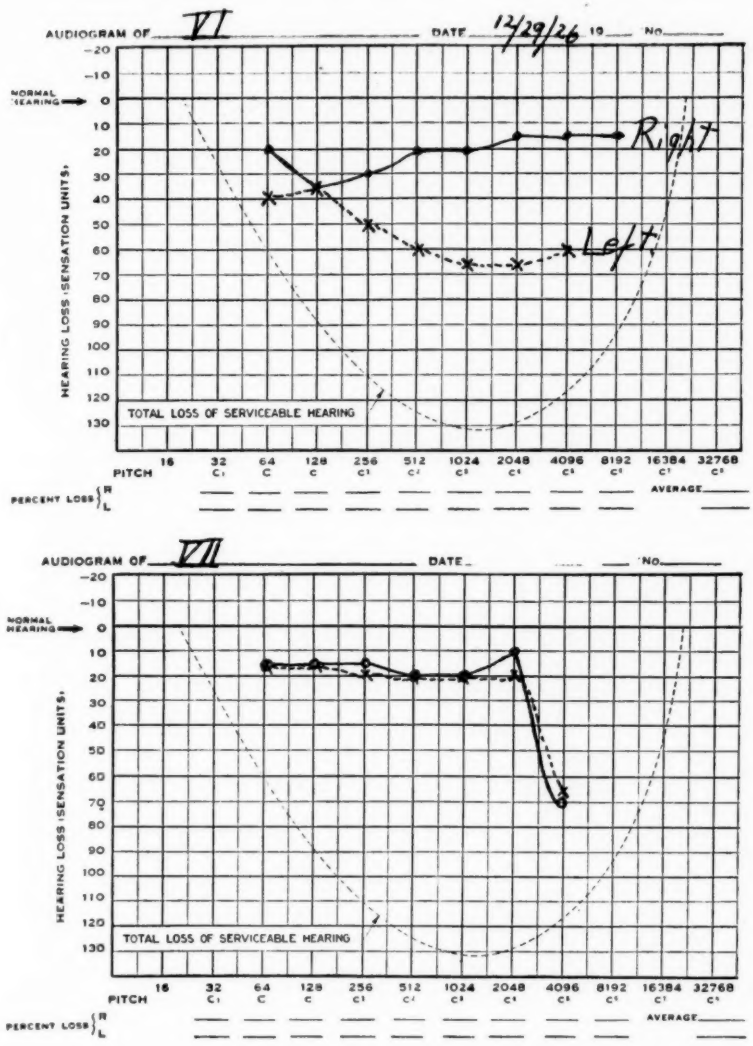
No. III, IV and V; No. III is that of a child with interstitial keratitis who had a four plus Wassermann in three laboratories. No nerve defect is noted. No. IV is the audiogram of the mother who had a four plus Wassermann in three laboratories. No nerve lesion is demonstrated. No. V is the audiogram made on the father of the child and shows a typical nerve lesion which very probably is of luetic origin notwithstanding the fact that his blood Wassermann is negative. This family finding is given simply to demonstrate that there are paradoxical conditions in studying audiograms. I am convinced that this man is luetic notwithstanding the negative blood. A spinal fluid Kahn would probably be positive but this was refused.

No. VI was made on a man in middle life who complained of left deafness of a very few weeks duration. The Weber was lateralized to the right and the Rinne was plus in the right and negative in the left. The Schwabach was normal in the right but markedly shortened in the left. His Wassermann was four plus in three laboratories.


AUDIOGRAM OF No III
DATE 9/10/31 19 NO.
NORMAL HEARING
HEARING LOSS (SENSATION UNITS)
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
TOTAL LOSS OF SERVICEABLE HEARING
Right
Left
PITCH
16
32 C1
64 C
128 C
256 C1
512 C2
1024 C3
2048 C4
4096 C5
8192 C6
16384 C7
32768 C8
PERCENT LOSS R
L
16 11 9 8 11 -4 0 11
23 17 14 12 -11 4 4 16
AVERAGE 5
10+


AUDIOGRAM OF No IV
DATE 9/10/31 19 NO.
NORMAL HEARING
HEARING LOSS (SENSATION UNITS)
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
TOTAL LOSS OF SERVICEABLE HEARING
Right
Left
PITCH
16
32 C1
64 C
128 C
256 C1
512 C2
1024 C3
2048 C4
4096 C5
8192 C6
16384 C7
32768 C8
PERCENT LOSS R
L
16 6 5 8 0 12 12 5
8 11 9 4 8 16 21 21
AVERAGE 8
12+


AUDIOGRAM OF No V
DATE 9/10/31 19 NO.
NORMAL HEARING
HEARING LOSS (SENSATION UNITS)
-20
-10
0
10
20
30
40
50
60
70
80
90
100
110
120
130
TOTAL LOSS OF SERVICEABLE HEARING
Right
Left
PITCH
16
32 C1
64 C
128 C
256 C1
512 C2
1024 C3
2048 C4
4096 C5
8192 C6
16384 C7
32768 C8
PERCENT LOSS R
L
8 6 5 8 11 51 64 48
26 22 18 20 19 39 60 59
AVERAGE 25+
32+



This was doubtless an acute luetic perception apparatus lesion involving only the left side. The fact that the Schwabach was normal in the right is very interesting when compared with the considerable defect shown in the audiogram.

No. VII is that of a man complaining of deafness in both ears which is a typical perception apparatus lesion. There was no history of lues and his Wassermann was negative.

Conclusions

The audiometer is a practical mechanism for making graphic records of hearing by which the future progress of the patient may be judged.

The audiometer is the only mechanism by which a reasonably accurate percentage of hearing loss may be determined.

The audiogram is the only practical graph by which a patient may be watched by different otologists.

A satisfactory audiogram can be made in many patients who seem unable to co-operate sufficiently for good fork tests. This is especially true in children.

There are other methods superior to the audiometer for testing the lower tones.

The audiometer is the best mechanism for testing the upper portion of the scale.

Defects in the upper portion of the tone scale call for a careful general examination of the patient.

An audiometric study should be made in every patient who complains of defective hearing.

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Discussion

Dr. A. R. Hollender (Chicago): I believe that the division in opinion regarding the value of the audiometer is to a large extent a biased one.

It is true, as the essayist has stated, that tuning forks are extremely valuable in functional tests of the hearing, and they undoubtedly will remain so for a long time to come, probably forever. There is no question that the audiometer is not a substitute for the functional tests of hearing. In my opinion and as the essayist has emphasized it is simply an adjuvant to the methods which have become standard with every otologist.

The best results are obtained by a correlation of the findings of all available tests. There are instances, however, in which you can make a tentative diagnosis by an interpretation of the audiogram itself. This, of course, must later be substantiated by fork and voice tests, laboratory examinations, and the history which is always significant.

I was sorry that Dr. Mundt did not show an audiogram for a typical case of otosclerosis. If you would see it you would never forget it. The picture is rather characteristic and does not vary much in graphic presentation in large numbers of cases.

From the standpoint of checking progress in cases under treatment, the audiometer probably serves its most useful purpose. The average patient who has a middle ear condition which is amenable to treatment will often be favorably impressed with the improvement which has taken place and which he can observe graphically. The doctor need not take the patient's word for it. The audiometer is a means of rapid determination and it can be handled by a trained nonmedical assistant.

Another important use of the audiometer is that of determining malingering. We frequently have these cases, particularly in industrial work. It is simple to test these individuals by the audiometer and reserve our findings as a double check against those obtained by customary procedures.

I enjoyed the paper very much. I have heard Dr. Mundt discuss this subject before. I am quite sure that those of you who are not now using the audiometer found some inspiration in this paper and will look into the subject a little further.

Dr. Horace Newhart (Minneapolis, Minn.): As an enthusiastic user of the audiometer for quite a number of years I cannot neglect this opportunity to compliment Dr. Mundt on his very fine presentation of the subject. We as a group of medical men know very little regarding the benefits and possible uses of the instrument and Dr. Mundt has made it very plain to us that it should be used more frequently than it is.

It has been my good fortune to live in rather close relations with the men who have done most to perfect this form of ear testing, Dr. Fletcher of the Bell Laboratories, and Dr. Fowler. I must say that they realize some of its limitations. What is more, there is an effort to meet one criticism. That is one almost universal, and which precludes the more general use of the instrument. That is the cost.

A week ago yesterday I was in conversation with some of the Bell Telephone Laboratories people, and I understand that they are hoping, in the course of time, to get out a simplification of the present audiometer which will permit its more general use by otologists, and even the general practitioner and insurance people.

The medico-legal aspects have already been touched upon. They can hardly be underestimated. Many a time what would we not give if, in making testimony regarding an individual's hearing loss, we had charts, audiograms covering his condition previous to the alleged injury, and then the results since, of tests made after the injury? Here is a very wide field of its application. Likewise in our school examinations, the examination of school children. Oftentimes the findings of the tests which are now made in upwards of 100 cities of America are challenged by parents, sometimes by the examining physician, if he be a general practitioner, because at the time he makes the examination he cannot confirm the findings made by the school examiner.

If in all doubtful cases or all cases in whom there is found to be a serious or significant hearing loss we could have an audiogram to substantiate the findings, it would be a great help in securing the early care of the child.

Dr. G. Henry Mundt (Chicago): I was in hopes somebody would get up here and tear on the fact that the audiometer was stepping on the

toes of tuning forks, because that has been the custom, and yet I have tried to make it clear that I believe there will always be a field for tuning forks. By tuning forks I mean a good set of tuning forks. As a minimum standard of a good set of tuning forks I should say a set of Bezold forks, because the ordinary tuning forks possessed by the average otolaryngologist, a little set of so-called Hartman forks, is in my opinion of little value. Certainly one cannot do very accurate work with these.

I appreciate the discussions of Dr. Hollender and Dr. Newhart. I did not show a typical audiogram of an otosclerosis case.

One must take into consideration the factor of life history, age, which is naturally a portion of the life history in determining such a diagnosis.

The last time I talked on this subject a doctor told me that the audiometer was no good because it cost too much. Dr. Newhart touched on that but I will say this to you: In the practice of otology, if an audiometer isn't worth the price that you pay for it, neither is the Lincoln Automobile. The one is just as valuable as the other.

I have gone over my time and if any of you want to see this audiometer, how it operates, I should be glad to show it to you.

We use four by six records in my office. We had our audiograms made small so that we can file them along with the histories of patients. That facilitates matters considerably. I should be glad to have anybody who wants to see this audiometer come up and see it now, or we can have it put out in the hall so that you can look at it later if you are interested in it.

IS PHYSICAL THERAPY AN "ADJUNCT" ONLY?*

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YORK, NEBR.

My first thought when scanning the preliminary draft of this paper was that an apology should be added or included. A second thought was that it was not necessary. One becomes weary of hearing from the platform and the printed page the iteration of apologetic tone, and the attitude of *ultra* conservatism where physical therapy is discussed in relation to other therapeutic measures.

Physical therapy has won its spurs, and cannot with fairness be placed in a subordinate position when it is clearly and understandingly indicated. I have not decided as yet whether the stereotyped phrase "I am a doctor first" was suggested by the council on physical therapy to prevent its practice as a "cult" (which is a futile effort—as the commercial effort of the manufacturers of physical therapy equipment will take care of that phase of the subject, without consulting the doctors) or whether it is an inferiority complex, or just a habit. An incident that might explain the latter supposition came to my attention two years ago, when I had the privilege of listening to an excellent paper on physical therapy. When the author of the paper returned to his seat, I complimented him on his presentation of the subject. Very formally he replied, "I thank you, sir; but I am a doctor first, a surgeon and gynecologist of many years standing." As I was at least twenty years his senior, and had practiced surgery and gynecology for nearly half a century I did not appreciate his point of view. The retort was probably just a habit. As a matter of fact, it should be obvious, not necessarily a matter for discussion among the members of any physical therapy society or of the American Medical Association, that to practice with any of the physical agencies successfully, one should not only be familiar with the fundamentals of physical agencies, combined with adequate equipment and proper technique, but also, as a foundation, to have a thorough knowledge of medicine, surgery, pathology and physical diagnosis, and all that these imply.

Scientific achievements outside the domain of medicine have made wonder strides, and who shall say that by the acts of men not always within our ranks, we have not kept pace with the results of scientific research. Professor Joseph Jastrow has remarked that the laws of nature are discovered but means for their practical application are invented, and here is the source of our progress. Jastrow in his book on, "Effective Thinking," also states that neither Hertz nor Roentgen,

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in their researches upon unknown waves, anticipated that the applications to surgery and medicine would prove to be the most important uses of their discoveries. Galvani, Volta and Faraday are typical as discoverers; Tesla, d'Arsonval, Nagelschmidt, Clark and others, as inventors. And as beneficiaries of their achievements our inheritance has amounted to what? Adjuncts only? No, it amounts to newer and better modes of treatment—the present peak of efficiency. Shall we not be logical? Is the present harvester-combine an adjunct to the hand sickle and cradle? Is the airplane mail carrier an adjunct to the pony express? Hardly. We have been warned against over-enthusiasm. Science is always conservative, but not much of value is accomplished without enthusiasm. However, it is generally realized that enthusiasm should always be tempered by good judgment and conservation.

Why should we be so slow to give credit where credit is manifestly due? Sometimes credit is given where it would be least expected. Surgeons have been very frank in accepting the comparatively new undamped cutting current as an advanced method in surgery. Quoting Weyth in substance, he said: "I regret having to lay aside the scalpel, the emblem of my profession, for something infinitely better." Kelly, of Johns Hopkins, and Kobak, of Rush Medical College, have both expressed themselves in a similar vein in their published works. Appended are a few case histories with the contention that the results would be difficult to duplicate by other than the so-called adjunct treatment.

Reports of Cases

Mrs. "D," age 36; one child, born dead, after an attack of eclampsia following albuminuria of pregnancy; history of acute Bright's disease when a child. Three years after birth of her child she was referred by a local specialist to an Omaha occulist, on account of a rapidly increasing blindness. She was sent back to the local occulist with an unfavorable prognosis. She was in turn referred to me for treatment. The diagnosis was interstitial keratitis. With one eye she could count fingers only. The other eye was not so badly affected, but the pupil was partly obscured. All layers of the cornea were involved, but there was absence of pus in the anterior chamber. (No constitutional treatment was given as a blood Wassermann was negative and neither chemical nor laboratory tests showed tuberculous infection which might have been suspected on account of her kidney affection.) She was given indirect diathermy treatments for fifteen minutes with a non vacuum eye electrode, patient grounded with an electrode from her back. This treatment was followed immediately by a treatment from a Kromayer lamp as follows: A short quartz rod was covered with adhesive plaster except a small opening at end of rod. This pencil of light was directed on the cornea at an angle which would prevent it reaching the retina. The first treatment was for a few seconds only. The reactions were quite severe and both treatments were repeated as soon as the reaction subsided. These treatments were continued for ten weeks, until the vision in the eye most seriously affected was 20/20 and still remains so after an interval of three years. Just as one swallow neither makes nor breaks a summer, neither can one dare say that the treatment was a mere adjuvant.

Mrs. "C," Mrs. "H," Mr. "F" and Mrs. "W"—four cases of facial erysipelas which were all treated during the same month. Mrs. "C": Infection spread from bridge of nose to either side of face. It cleared up after three treatments with air cooled ultraviolet radiation, the first two treatments being second and third degree reactions, the third being a fourth degree erythema. Mrs. "H": Facial erysipelas (phlegmonous), extending to the scalp and involving both ears. One third-degree treatment and one fourth-degree treatment cleared it up. Mr. "F": Facial erysipelas on one side of face only. Had several previous attacks which were treated by orthodox methods. Treatment given with air-cooled lamp, third-degree erythema. I called to see him four days later and the infection had spread to the other side of his face and extended to the scalp. One other treatment cleared it up. No drugs were given. Mrs. "W": Erysipelas on both sides of face from mouth to scalp. One treatment, fourth-degree erythema, was given, each side of the face being treated separately. One treatment was sufficient. I have this to say in regard to my control studies: Every such case I have treated in the last forty-seven years were my controls. My observations frankly indicate that orthodox procedures were extremely inferior to a treatment that was *not* an adjunct to constitutional treatments with masks and ointments used externally.

Mrs. "H"; age 45. General health was good; all teeth had been extracted several years previous. She had been wearing full plates, both upper and lower. During the preceding three months she had suffered severe paroxisms of pain over the course of the facial nerve. More recently this attack occurred many times during the day, being brought on by laughing, talking, eating or using the handkerchief. The diagnosis was trifacial neuralgia or tic-dolorou. The exact hyperesthetic spot was not located as the patient objected to an attempt to locate it, but it was near or within the nares, under or above the upper lip. Several diathermy treatments were given, with electrodes on either side of face, just anterior to the lobes of the ear. This reduced only the frequency of the attacks. Dr. Franz Nagelschmidt's plan of treatment, consisting of

the application of very fine sparks from a vacuum tube outside the hyperesthetic area and finally directed over the area, was objected to by the patient as it invariably brought on an attack. I was not in favor of nerve blocking, or alcohol injections, and the patient rejected the suggestion of surgical relief. On empirical bases ultraviolet was used because of previous experiences which demonstrated its pain relieving qualities. The dental plates were removed and a fourth degree erythema was given, including the roof of the mouth and both surfaces of the upper lip. This gave immediate relief and was repeated several times after the reaction had subsided. I have checked up on this patient every three months for one year and have found her free from pain. There has been no recurrence. This was an effective substitute for nerve blocking with causes temporary paralysis, and also for the serious surgical operation, which, of course, in the hands of a Cushing is successful; but we cannot send all such cases to Boston, and many surgeons do not care to operate. Some years ago, in Chicago, Dr. John B. Murphy in introducing Dr. Cushing, said that he, himself, had operated 12 cases with 50 per cent mortality, while Dr. Cushing had, without a loss, operated 38 consecutive cases by dividing only the posterior root of the Casserian ganglion. In the above case history, physical therapy was a full brother and not an adjunct.

A child, two years of age; cavernous angioma on the back; part of it, 2½ inches in diameter, was above the level of the skin; it had a deeper purple rim surrounding the raised portion. The parents lived in another state and I referred them to a dermatologist in Kansas City where I had seen several similar cases treated with ultraviolet, with marked success. But they elected to come to me. I wrote to this colleague in Kansas City, asking for the time and frequency of treatment. He declined to advise me without seeing the patient. I decided that no harm would ensue from some variation in the length or frequency of treatment, and gave fifteen and twenty minute treatments with Kromayer lamp, with compression, which were repeated as soon as the skin desquamated. The attempt was successful after eight or ten treatments. No appreciable scar resulted as would have occurred after galvanism; there was no hemorrhage and chance of infection as would have followed surgical interference.

This small group of cases are only typical of so many cases that could be furnished where any other form of treatment would not be so efficient.

Having mentioned "Controls" earlier in this paper, and if time will permit, I should like to give briefly my personal reaction to the subject. In tests and research work with inorganic materials, controls are of much value because they are decisive and dependable—much more so than controls attempted in organic or biological work. At the present time a series of cases reported without controls is looked upon with suspicion and distrust.

Not long ago I heard the author of a paper reporting six cases without controls, or at least only one, severely and, to my mind, unjustly criticized. How could this or any critic evaluate the factors in these controls in regard to heredity, environment and personal resistance?

In a late medical journal a writer, in an effort to find the cause of recurrence of gastric ulcer, grouped a number of cases "Suspender" wearers vs. same number wearing "Belts". The suspender class, as one would think, won out with only 35 per cent recurrences. The wearers of belts had over 70 per cent of recurrences. But how were they selected? If by severity of the cases, it was unfair. If counted off "one, two, one two," like a company of soldiers, it was only a guess. If these controls had been "shuffled" he would have obtained a different percentage each time. The second law of thermodynamics is that "random always increases and never decreases." It might be argued that this law might be invoked against my argument. But the fact remains that, in my opinion, biological controls have too many unknown factors to justify the importance ascribed to their use.

Conclusions

Physical agencies are founded upon natural laws that have always existed. These laws were discovered by talented men both within and without our profession. Equally endowed men have invented means and equipment by which practical application could be made for therapeutic uses. The foundations of this mode of treatment are logical, secure, and permanent, for the original laws as well as their reproduction by the genius of man, are indispensable to vegetable and animal life and have been the environment of humanity for untold ages.

Discussion

Dr. N. H. Polmer (New Orleans): Dr. Moore has propounded a question, the answer to which requires more and more thought. Is physical therapy merely an adjunct to other treatment methods? If so, will the physical therapist become merely a dignified applier of electrodes or a pompous snapper of the switch?

To me it seems that physical therapy is a brilliant band in the spectrum of modern therapeutics. Its band lies between that of medicine

and surgery and grades off into each. There is a well known law of physics which states that a part cannot be greater than the whole. Physical therapy cannot be greater in its scope than the entire field of medicine and surgery.

However, biophysicists have shown that certain wave bands of light have an optimum therapeutic effect on certain pathological conditions. In rickets theoretically if we could produce monochromatic beams of light at about 3020 A.U. it is said that our results would be better than if we used the whole gamut of radiant light and heat. Similarly there are many diseased states and pathological conditions which can be treated by physical agents almost to the exclusion of other methods of treatment. I refer here to localized benign and malignant lesions of the skin and mucous membrane, to furunculosis and superficial infections. We have seen acute torticollis, acute myositis and "golf player's back" respond beautifully to a couple of treatments of heat plus mechanical drainage.

We have diagnosed and cured four cases of hysterical paralysis with faradic and sinusoidal stimulation when treatment with other methods failed to accomplish the desired result. We have electrodesiccated and eradicated benign and potentially malignant lesions of the tongue and eyelids when plastic surgical operations had been recommended. We have seen the red blood count and hemoglobin increase in anemias under ultraviolet radiation, but certainly we would not deny our patient the added benefits of iron, sodium cacodylate, diet, and even blood transfusion when indicated.

To our way of thinking it seems that physical therapy at times offers us a brilliant monochromatic band of treatment method which may be a near specific. At other times it shines, though no less brightly, with other lights in our constellation of effective therapeutic agents, as an ally, a co-partner, a full brother to modern medicine and surgery.

Dr. W. P. Grimes, (Kansas City, Mo.): As I listened to the presentation of this paper, I was impressed not only with its substance but its tone. I wish to commend the doctor for the courage he displayed in choosing such a subject, even in this advanced stage of physical therapy, for there was a time—not far back—when one could not dare tell one-half the truth of what physical therapy can accomplish and remain in good standing and fellowship, not only with our national society but even with the rank and file of our practitioners. He convincingly held up its merits to our view and compared it with medicine and surgery in basic principle and therapeutic application.

What type of individual would attempt to prepare, cook and eat a meal ignoring the knife, fork or spoon? Or, which is the most important leg of a three legged stool? Or, what two members of the body can say to the others, "You are merely adjuncts"? In the great remedial system of human ills, medicine, surgery, physical therapy, hygiene and dietetics — no one of these should be considered "merely an adjunct" but a component part of the whole. Medical diathermy, surgical diathermy, radium, x-ray, ultraviolet, radiant and infrared rays with the many mechanical and chemical currents, such as the sinusoidal and static, are the advance methods in an advanced age in dealing with the problem of disease.

ARCHIVES of PHYSICAL THERAPY, X-RAY, RADIUM

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E D I T O R I A L S

THE AUDIOMETER

In spite of the fact that numerous otologists are now in disagreement concerning the value of the audiometer, there are those who believe that it represents a distinct contribution to modern otology. Whether or not it was intended to displace the customary functional tests for hearing, if it serves only as an aid to these, it must be accepted as a scientific means of determining certain important factors which assist in the diagnosis of hearing impairments. Its utilization, also, to determine progress made with treatment cannot be overlooked, but more important is the fact that it offers a standardized means of comparing notes when patients find it necessary to travel or to change their locations for permanent residence. Probably one of the outstanding uses of the Audiometer is in industrial cases or in cases which involve some medico-legal aspect. Here the graphic representation makes possible an observation which no words can adequately describe.

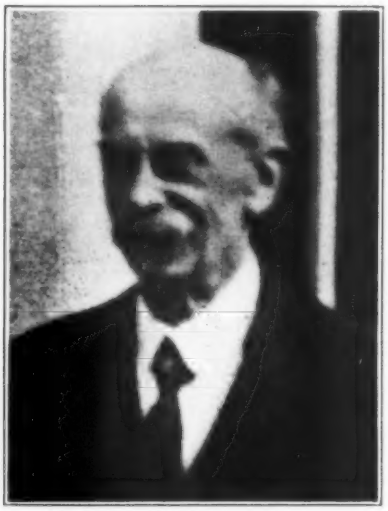
In an article, elsewhere in this issue, Mundt has called attention to these various facts. His experience with the Audiometer has proved to him that, while it is no substitute for the tuning forks, it serves a useful purpose when all facts are correlated in the making of a final diagnosis.

It should be stated that the Audiometer is not infallible. It should be emphasized, too, that the instrument is not to be employed as an exclusive means of diagnosis. Mundt stresses these cautions, and the well-trained otologist will promptly appreciate them.

The unfortunate situation regarding the high cost of the instrument has been held out by some as an argument against its wider adoption. This sort of controversy cannot be entertained when the scientific aspects of a piece of apparatus are considered. The fact remains that it has been

used to test large groups of school children, and information has thus been obtained which otherwise would not be possible without an unusually large amount of work and great expense.

The otologist who has placed the Audiometer in his office has found it an instrument of decided advantage. The reasons need not be detailed again, but suffice it to say, that those who have constantly found objections to its use, have not presented reasonable arguments. As time goes on, it doubtless will be considered standard equipment in every otological clinic and in every otologist's office.



RETIREMENT OF PROFESSOR d'ARSONVAL

The news of Professor d'Arsonval's retirement from the chair of Physiology at the College de France, at the age of 81, in possession of all his intellectual activities and weighted with many honors, suggests the desirability and indeed the need of an authoritative restatement of all the data regarding d'Arsonval's contributions and influence in connection with high frequency therapy. We realize the necessity for this because of the legendary character of the man, the misinformation that is tending to infiltrate this field, and the necessity for data of an historical character which will stand as a future buffer against the careless interpretation of this man's contributions. Such a symposium has been planned for a not far distant issue of the ARCHIVES, the respective articles to be by outstanding international authorities on the subject.

In connection with d'Arsonval's researches in the field of high frequency current, scientific medicine now enjoys the advantage of sufficient perspective to acknowledge his labors as of outstanding value. The more than forty years that have elapsed since the first publication of his work calling attention to the heating qualities of high frequency current have made his name a legend synonymous with high frequency therapy.

The fact that d'Arsonvalization has gradually been replaced by diathermization is but an index of changing opinions. The substitution demonstrated many advantages in favor of diathermy but it has in no way replaced the total benefits of the former. In the light of greater orientation with the subject, the students of high frequency practice are now inclined to retrace their opinions regarding d'Arsonvalization and are again attempting to re-incorporate the d'Arsonval solonoid as an active part of high frequency therapy. We are now beginning to suspect that it has many overlapping advantages that have not been duplicated by newer apparatus.

In the meantime it is the sentiment of the members of the American Congress of Physical Therapy and no doubt also the readers of this comment to offer happy felicitations to the aged master on his retirement in a state of good health and intellectual activity. We wish him many continued years of serene contentment.

SECTION ON COLONIC THERAPY

The recent rapid increase in popularity in the use of colon irrigations as a therapeutic measure, still further unduly stimulated and encouraged by equipment houses featuring their respective apparatus, has threatened to place this valuable procedure in the unenviable position of a fad and its legitimate exponents under suspicion of dishonesty of motive. Unfortunately, unqualified persons and institutions have been quick to realize the potentialities for private gain through unethical advertising and exploitation of this measure and have thereby brought discredit upon it entirely unjustly. Honest doubt as to the real value of colon irriga-

tions is therefore naturally to be encountered. However, blind criticism, ridicule and blanket condemnation of this procedure, such as is indulged in by some of our prominent medical writers is utterly inexcusable unless qualified. True, the medical profession has not concerned itself seriously with this measure in the past, as by common consent it had been relegated to the nursing profession. Yet in view of its change of status, its exploitation, and of the confusion of ideas and undiscerning criticism with which it is at present engulfed it has seemed expedient that those truly interested in the scientific application of this modality should organize a group dedicated to the study and development of methods of treating colon stasis and allied conditions by physical means.

It is in accord with this idea that the American Congress of Physical Therapy has sanctioned the formation of a section on Colonic Therapy as a subsidiary to and within its organization.

Ratification of this section cannot take place until the annual business meeting of the Congress to be held in New York in September. However, in anticipation, this section has been granted one full day for presentation of its scientific demonstrations and papers. A well-balanced program of the best available thought in this field is already being planned for this day. A banquet in the evening for the purpose of fellowship, organization and round table discussion is also under consideration. It is most earnestly desired that all interested in this subject whether members of the Congress or not attend these sessions.

PHYSICAL THERAPY IN STOMATOLOGICAL PRACTICE — A NEW SECTION ON STOMATOLOGY FOR THE ANNUAL SESSION

Physical therapy has established itself in stomatological practice. The recent Congress on physical therapy in stomatology gave evidence of the fact that numerous workers are now attempting to determine the possibilities of physical methods in this field. Some data are now available on the uses of light for certain lesions of the mouth, on the application of surgical diathermy for benign and malignant new growths, and on the treatment of apical infections by means of galvanic ionization. The oral surgeon has come to appreciate the value of these newer procedures because they have enlarged his therapeutic armamentarium.

The pioneers in this work deserve unusual commendation because they have had little to guide them in their experimental endeavors. They have had to seek their information in the other specialties of medicine and surgery. They have had difficulties in applying the knowledge so acquired. Several, however, have had the foresight to judge, that if improved clinical results were possible through the use of physical methods in other specialties, they were possible also in stomatological practice.

The literature has not contained many contributions on light, heat and electricity in stomatology because of a lack of unified effort to stimulate an interest in this field. The recent Congress has done much to bring about a different situation. There is a keener interest now manifested, and leaders in the specialty are endeavoring to organize groups of men who are conducting laboratory and clinical investigations in the newer science.

The American Congress of Physical Therapy is taking the lead in this country in its effort to bring together those men of the medical and dental professions who are interested in the progress of physical therapy in stomatological practice. In connection with the eleventh annual scientific session which meets at the Hotel New Yorker, in New York, September 6, 7, 8, 9, 1932, a special section on stomatology will be conducted. A full day's program is being arranged through the efforts of Dr. Alfred J. Asgis of New York City. In addition to the scientific papers and addresses, clinical demonstrations will be offered at several New York institutions on Saturday, September 10, which has been designated as the official "Clinic Day."

This is indeed a rare opportunity for those who seek information on physical therapy in stomatology. Participants for the program are being selected with great care. It is the aim of the program committee to gather together outstanding authorities and research workers in order to have the program speak for itself. Dental surgeons are

welcome to attend all the sessions of the Congress, and in particular, to take an active part in the organization of this new section, which will, hereafter, be an integral part of the annual meetings. Papers and addresses presented before the section will be published in the ARCHIVES, and will thus be available as a permanent record of transactions.

THE COMMERCIAL EXHIBITS OF THE ELEVENTH ANNUAL SCIENTIFIC SESSION

It is indeed gratifying to note that more than three-fourths of the space available for commercial exhibits, for the eleventh annual session, has already been reserved. The progressive manufacturer or dealer has experienced the necessity of exhibiting his newer equipment to a concentrated group of physicians who are interested in physical therapy and who are always eager to acquaint themselves with the newer developments in apparatus. Those manufacturers who have attended former conventions of the Congress know the value of exhibiting at these gatherings.

The eleventh annual session which meets at the Hotel New Yorker, New York, September 6, 7, 8, 9, 1932, should be the outstanding event in the history of the American Congress of Physical Therapy. The preliminary program is now nearing completion. Two distinct sections have been added, one on Colon Therapy and one on Stomatological Practice.

The New York Committee, of which Dr. Norman E. Titus is chairman, is exercising every effort to make the eleventh annual session a success. There is every reason to believe that those who come from even remote parts of the country will be well repaid for their time and expense. The program will be unique in many respects. The variety of papers, round table talks, demonstrations and clinics, should prove most attractive to every physician and technician in the work.

Manufacturers who contemplate exhibiting at this session are urged to get in touch with the central office at once. Diagrams may be had by addressing American Congress of Physical Therapy, 30 North Michigan Avenue, Chicago.

The following have already made reservations:

Archives of Physical Therapy, X-Ray, Radium.
Adlanco Industrial Products Corporation.
Balneo Products Co., Inc.
Boston Medical Engineers.
The Burdick Corporation.
Cameron Surgical Specialty Company.
Comprex Oscillator Corp.
Electro Therapy Products Corp., Ltd.
H. G. Fisher & Co., Inc.
General Electric X-Ray Corp.
Hanovia Chemical & Mfg. Co.
High Tension Corp.
Kalak Water Co. of N. Y., Inc.
The Kelley-Koett Mfg. Co., Inc.
Lasker Medical Specialties Corp.
Peerless Medical Equipment Corp.
Schellberg Mfg. Corp.
Westinghouse X-Ray Co., Inc.

ENGLISH SCIENTIFIC WRITING

Some years ago, the statement was attributed to Sir James Barrie that the man of science appears to be the only man who has something to say just now, and the only man who does not know how to say it. Without verifying the quotation, it may be admitted that it sounds like one of the remarks of that pleasant writer, though it does not seem to lie in his line of country. In the mouth of a literary man, the criticism looks rather as though it ought to have been made by Stevenson, who by his illustrious antecedents would have had the chance of observing any ground for such comments, and by his disposition would have been not disinclined to make it. It is, perhaps, not fanciful to imagine that the reason Stevenson made no such remark was that the scientific writing on which he was brought up did not suggest or justify it. At present, however, taking the statement to refer to the average scientific paper published in the English language, and to exclude some conspicuous exceptions, it cannot be denied that it is substantially true. Probably there is no country in which better scientific work has been done since science emerged from the dark ages than in the United Kingdom. Its quality does not seem to be falling off, and of late years its volume has been constantly increasing. Its immediate value, on the other hand, is suffering from the fact that a large

number, and possibly a majority, of those who do the work do not exceed in describing it effectively or clearly.

The rules of good writing doubtless vary with the purpose of the composition. The late C. E. Montague, an admired master of the art, pointed out, for example, that in composition intended to stimulate the imagination of a reader, or perhaps even to persuade his judgment, writing may be too clear, and at its best should suggest a conclusion to the reader, rather than formulate it explicitly. An old advocate's trick is so to shape his argument as to lead the judge to form the desired conclusion for himself, without having the words put in his mouth. There is undoubtedly a pleasure to be obtained from reading such matter, in which the reader is set to co-operate with the author to a modest extent. At all times the writers of speculations upon scientific results have been able to give such pleasure to their readers, and the amazing developments of modern physics give greater opportunity than ever for such composition. It would be unfortunate if scientific men were precluded from publishing more than their definitely ascertained results, and could not communicate also their ideas of possible explanations or extensions before these had been demonstrated conclusively. Even in such writings, needless haziness or ambiguity is undesirable, but such works are to be distinguished from what may be called scientific writing proper, in which the writer is concerned to describe the observations and studies by which he has made additions to knowledge. It is of writing of this class that the present complaints are made, and, even in this primary or proper scientific writing, a distinction may be drawn between what is addressed to workers in the same field, and what is intended for other readers. No such distinction, however, can avoid the fact that in each class, while the primary business of the writer is to be clear, he allows himself too often to be obscure.

In Mr. Rollo Appleyard's collection of essays on *Pioneers of Electrical Communication*, a suggestive incident is related of Oliver Heaviside. He submitted a paper to the Royal Society which the Committee directed to be published in the Philosophical Transactions, but each of the two referees, "while reporting favorably upon what they could understand," complained of the exceeding stiffness of the paper, and one said it was the most difficult he had ever tried to read. The circumstance may be consoling to persons who may have had difficulty in understanding papers in the Philosophical Transactions, by showing that even the referees do not profess to understand all of them. Nevertheless, no one would be likely to question the late Lord Rayleigh's observation in transmitting the Committee's decision, that without illustrations or further explanations no one would be likely to take advantage of the work. Admittedly, scientific men have to use their own mathematical or other shorthand if they are to cover the ground. A worker on a subject, moreover, gets to know his way about it, and for his own purposes comes to omit links in reasoning which have become unnecessary to him. He is, so to speak, in something of the same position in regard to a reader as he would be if, working in three dimensions, he had to explain his results to an inhabitant of flatland. There is no objection to his using his formulæ, if they do not cause him to forget the structure of his reasoning, or to his working the problem by reasoning in three dimensions, if that happens to be convenient. But if he does so, he ought to make sure that the reader has the means of understanding the shorthand in which the results are expressed, or that they are translated into two-dimensional language. Some of the more expert devisers and users of mathematical shorthand were, indeed, among the most insistent on the necessity of keeping its physical meaning in mind. It has been said, for instance, by persons who worked under the late W. K. Clifford, that his lectures on pure mathematics were concerned mostly with physical illustrations.

Even, therefore, as pundit to pundit, a writer may be well advised to make sure from time to time that his esoteric language is intelligible to his readers, and that he himself is keeping due account of its difficult meaning. When, however, he is writing for lay readers, he has even less latitude. It is his business to submit not a jig-saw puzzle for the readers to put together, but an immediately intelligible statement of observations and measurements, with such conclusions as they seem to him to suggest. The work he is recording may have been long and laborious, with a succession of phenomena which at first seemed to be without meaning, and then to acquire one, which

then seemed incompatible with existing knowledge, and so forth. The worker may well have got stale on the particular points involved, and may not find it easy to extricate from the records of his laboratory notebook an orderly statement of the results and of the conclusions to which they lead. Nevertheless, his work is not complete until he has done so, and it is done inefficiently if the reader has to take avoidable pains in order to define the author's meaning. Readers of scientific papers have also their own preoccupations, in the midst of which it is difficult enough for them to keep pace with even clear expositions of scientific progress. Grammatical errors the reader can usually correct for himself as he goes on, but it is not so often possible for him to give an exact meaning to an undefined or ambiguous sentence, or to see the logical connection between sentences, paragraphs, and chapters by which he should be led to the author's results, argument, and conclusions. There may be good grounds for saying that the general inaptness of English scientific writers to express their results without ambiguity, and to give a logical structure to their argument and conclusions, is the fault of the way they learned to write English in the course of their earlier education. Such a reason, however, does not alter the fact that loose writing may delay readers in understanding its meaning, or may conceal it altogether.

A great deal, indeed, of English scientific writing reads as though it had been precipitated—it would be misleading to say composed—in Dogberry's belief that "to write and read comes by nature." Sometimes there seems ground for fearing that one result is to prevent the writer from thinking as clearly as he might have done if he had been able to make clearer his meaning to his readers. However that may be, it is certain that often this unworkmanlike writing imposes an intolerable burden on those who are dependent on it for necessary information.—*Engineering* (*Brit. Jour. Rad.*)

CURRENT NEWS AND SCIENCE

A Warning Against Radio-Active Waters

Dr. Harrison S. Martland, Chief Medical Examiner for Essex County, New Jersey, warns against the use of radio-active waters and radium emanators in a report which appears in the October, 1931, issue of the *American Journal of Cancer*. Dr. Martland's paper is most interesting and comprehensive and is based on his study of the effects of radium poisoning in luminous watch dial painters. He concludes that it is dangerous to increase the normal radio-activity of the human body on the strong presumption that increased amounts of radioactivity over a number of years may produce cancer.

Some of the radio-active waters for sale, if taken according to directions, would introduce into the body each day an amount of radio-active substance equal to that taken by some of the dial painters. In the blood, these soluble substances change to more insoluble carbonates, phosphates and sulphates and eventually deposit in the bones. Once there, there is no known way to eliminate them or to protect the body from the bombardment of alpha particles, with the exception, possibly, of methods of treatment similar to those used for chronic lead poisoning.

A Super Roentgen Ray Tube

All the radium in the world could not produce rays of greater intensity than the new 900,000 volt, cascade roentgen ray tube of the New York Memorial Hospital, Dr. G. Failla told physicians at the meeting of the American Physical Society in Chicago, November 27. The tube is used for the treatment of cancer.

One and one-half inches of lead are easily penetrated by the rays from the new tube which was developed by Dr. W. D. Coolidge of the General Electric Company. Running at 700,000 volts and five milliamperes, the radiation from the tube, Dr. Failla said, is equivalent to the rays from 600 grams of radium, the total amount that has been isolated in pure form.—*Jour. Mo. M. A.*

Hormone Treatment of Cancer

In a pamphlet published at Kyoto, Japan, Dr. T. Ishihara, describes what he calls the "P-O-U" (Pituitary-ovary-umbilicus) hormone treatment of cancer. The principal component is a hormone, stated to be contained in Wharton's jelly of the umbilical cord, which has the faculty of decomposing decidual cells and cancer cells. The remedy is administered orally and many rapid clinical cures are reported. "P-O-U" is also stated to have diagnostic value in the case of cancerous tumors. —*Clin. Med. and Surg.*, (January), 1932.

The Nature of the Cosmic Rays

When history gives its judgment on the importance of our generation it is not unlikely to decide that we are memorable only by the progress which we made, guided by radium, in solving the riddles of the universe. It has been known for a quarter of a century that as radium and other radio-active substances break up, and are transformed, they give off three products which have been called alpha rays, beta rays and gamma rays. The alpha particles turned out to be helium, the beta particles electrons such as are found in the atoms of all the elements. What, then, are the gamma rays?

It is not an abstract problem, but a question of very lively interest. One of the potent, mysterious forces in the universe is a form of radiation which has much resemblance to gamma rays. Large quantities of this force are continually reaching our earth. With the gamma rays it is to be considered a phenomenon of the same kind as heat and light, ultraviolet rays, and x-rays, waves distributing energy. The gamma rays which we detect from radium have a very short wave-length. These cosmetic rays are still shorter. The penetrating power increases as the wave-length decreases. Ultraviolet rays penetrate our flesh farther than light, x-rays still farther. Gamma rays will penetrate inches of lead. The cosmic rays have gone through sixteen feet of lead. Where do they come from? It is certainly

from the depths of outer space. One theory is that far away in the unthinkable cold between the stars cosmic energy is perpetually building up hydrogen and from hydrogen the heavier elements—the universe is in process of perpetual creation—and in this building up of matter radiation is set free as upon our earth in the disintegration of matter. The theory is strongly contested. But all agree that the cosmic rays, whatever their source, are working continual, immense changes on our earth. Every second their force is breaking up countless atoms in us and all about us. One bold speculation has it that this cosmic radiation is the means by which individuals and species are changed, by which the evolutionary process has made slime into animals and animals into men. — *Daily Telegraph. Brit. Jour. Rad.*, (December), 1931.

Vitamin Prepared Chemically for First Time in History

A vitamin has been manufactured in the laboratory by strictly chemical methods for the first time in history, Drs. Charles E. Bills and Francis G. McDonald of the Mead, Johnson & Co. Research Laboratories, Evansville, Ind., have reported to the American Association for the Advancement of Science.

They synthesized vitamin D, the so-called sunshine vitamin, by treating ergosterol with nitrogen monoxide gas and obtained the potent vitamin without the use of ultraviolet radiation. At present vitamin D is made by shining ultraviolet light on ergosterol, whereas before the relationship between vitamin D and sunshine was discovered five years ago, children had to take cod liver oil to obtain vitamin D that prevents rickets.

The synthesis of the vitamin is carried out in solution with methyl alcohol, ether and ethyl acetate at low temperature and with rigid exclusion of oxygen.

An extremely pure non-crystalline preparation of vitamin D was described by Drs. Bills and McDonald. In company with four European laboratories, the American scientists have also produced crystalline vitamin D. The purest of these substances is claimed to be the most potent drug known.—*Science News Letter*, January 9, 1932.

The Retirement of Professor d'Arsonval

Professor d'Arsonval, one of the leading authorities in physiology, has given up his chair in the Collége de France. Professor d'Arsonval is 81 years old but still possesses all his intellectual activity and never fails to attend the weekly meeting of the Academy of Sciences, of which he has been a member since 1894. But he has not attended the meetings of the Academy of Medicine for many years, although he has been a member since 1888. His scientific career was begun in the Collége de France in 1876, as assistant of Claude Bernard, of whom he became one of the principal collaborators. In 1882 he was appointed director of the laboratory of biologic physics in that institution and in 1894 became professor of experimental medicine. His name will remain associated with the study of high frequency currents and their medical use, termed today "d'arsonvalization." In connection with his retirement, the government bestowed on him the Great Cross of the Legion of Honor. The Collége de France has appointed as his successor Prof. Charles Nicolle, director of the Institut Pasteur de Tunis and a Nobel laureate, whose important researches on microbiology are universally known, notably on the rôle of lice in the transmission of exanthematous typhus, the immunizing effects of convalescents' serum in measles and scarlet fever, and the parasitic diseases of plants.—Foreign Letters, *J. A. M. A.*, (April 23), 1932.

Sir Henry Wellcome Honored

The British Medical Journal, London, contains the announcement that at a meeting of the Council of the Royal College of Surgeons of England, Lord Moynihan, President, in the chair, The Right Hon. Lord Dawson of Penn, P.C., G.C., V.O., K.C.B., K.C.M.G., Physician to His Majesty the King, and President of the Royal College of Physicians of London, and Sir Henry Wellcome, LL.D., F.S.A., founder of The Wellcome Research Institution, were elected Honorary Fellows of the Royal College of Surgeons.

The Royal College of Surgeons of England is one of the most exclusive scientific bodies in England, and the bestowal of this

honor on Sir Henry Wellcome is very exceptional in that aside from members of the Royal Family, Sir Henry is the second person not holding a medical degree upon whom this rare distinction has been conferred, the first and only other recipient being the famous Field Marshall, Lord Roberts of Kandahar.

Sir Henry Wellcome is of American birth and is well known for his world-wide scientific work and extensive pioneer researches in connection with tropical diseases, including the founding of The Wellcome Tropical Research Laboratories at Khartoum on the Upper Nile Regions of the Sudan, Africa. He is also a Director of the Gorgas Memorial Institute, Washington, D. C., with its Tropical Research Laboratories at Panama.

Our Universe Is Deathless

New mathematics indicating that the universe may possibly go on living forever was presented to the National Academy of Sciences at Yale University on November 18.

The scientific theory for years has been that our particular universe is bound some day to freeze up, a form of universal death, not only for earthly life, but for all forms of energy.

The new mathematics was explained by Dr. Richard Chase Tolman of California Institute of Technology, one of the best known mathematicians in the world, and one of the men with whom Einstein conferred a year ago.

The old "heat death" theory is based on the undeniable facts that matter is rapidly being converted into heat, light and the other forms of radiation, and the thermodynamic laws which seem to prevent a reversal of this running down hill process.

Dr. Tolman has created some mathematical "models" of creation in which this seemingly impossible reversal takes place. He treats these models as partly analogous to actual facts, each differing from present known realities in some significant respect.

If radiation, that is, light and heat, start converting themselves back into solid matter, the universe which now is running down, can some day again renew its youth. In one model Dr. Tolman finds this mathematically possible, provided matter changes into radiation fast enough to maintain a certain necessary equilibrium or balance.

Other models which show possibilities of rebuilding an aging universe are produced by applying the principles of relativity to thermodynamics.

Under the new thermodynamic principles thus created the old law of conservation of energy, which seems to require that the universe shall ultimately freeze up, works differently.

Magnetic Atoms May Be Building-Blocks of Matter

That atoms a million times smaller than the ordinary chemical atoms are perhaps building blocks of matter is the suggestion made by Dr. P. A. M. Dirac of Cambridge University and Prof. O. W. Richardson of King's College, London.

Such atoms would be magnetic rather than electric like the present electron and proton of which all the chemical elements are composed. Recent developments of the quantum theory, Dr. Richardson points out in a recent issue of *Nature*, would require the existence of magnetic atoms.

The idea that matter, electricity and energy are grained, lumpy or made of irreducible atoms has been a very valuable one in modern science. Dr. Richardson concludes that these atomic magnetic poles are much less abundant than electrons and protons.

The discrete magnetic poles would need to have a strength of sixty-eight and one-half times the corresponding electron mass.

The frequencies of special lines emitted by the magnetic atoms, says Dr. Richardson, must be some ten million times those of the electronic spectra.—*Science News Letter*, November 28, 1931.

Speeding Electrons Make Large Molecules Form

By shooting high speed electrons into vapors of various organic substances, some new substances with larger molecules than the original ones have been formed at the University of Toronto by Prof. J. C. McLennan and Dr. W. L. Patrick.

Grain alcohol, methyl, alcohol, formaldehyde, acetaldehyde and acetone, simple organic substances, were used in these experiments, Gaseous hydrogen, methane and carbon dioxides were formed by the later decomposition of the yellow complex compounds formed under the direct action of the rays.

The initial clumping process, called "condensation" by chemists, is expected to assist in solving new problems of the structure of chemical compounds. Similar complex substances have already been formed by exposing organic vapors to the bombardment of radium gamma rays.—*Science News Letter,* November 14, 1931.

New Association of Radiologists in South Africa

At a meeting of radiologists, held at Johannesburg on the 18th September, 1931, the advisability of the formation of an Association of Radiologists practicing in South Africa was discussed, and it was resolved that such a body shall be instituted. A provisional executive was appointed to draw up a draft constitution and communicate with all recognized radiologists, with a view to the formal founding of a society at a general meeting to be held at a convenient date. The provisional executive is as follows: Chairman, Dr. F. H. Dommisse, General Assurance Buildings, Cape Town; Secretaries, Drs. P. J. Olivier, Harley's Buildings, Jeppe Street, Johannesburg, and J. van Roojen, New Somerset Hospital, Cape Town. Will all radiologists interested kindly send their names and addresses to either the Chairman or Secretaries, in order that the provisional constitution drawn up by the above committee can be forwarded to them for their consideration.—*Jour. Med. Assoc. S. A., (B. M. A.).*

Deciphering Palimpsests

What the air-photograph does for the "palimpsest" of the English countryside, ultraviolet rays do for the thing itself. The following interesting account of a new method has been contributed by Mr. Leonard V. Dodds:

Owing to the labor and cost of production, parchments used in olden days for writing upon were not destroyed when time had rendered a document worthless. Instead, they were carefully cleaned by chemical or mechanical means and used a second, and even a third time. In many cases the earlier writings would be of much greater historical interest than the superimposed and visible text, if only it were possible to read them, and this, strange as it may seem, can now be done. By using the method developed from the researches of Prof. G. R. Kögel of Vienna, writings which were erased hundreds of years ago can be read, and photographs taken for permanent record, and when the method is more widely used, a considerable amount of material will be available which may be of the greatest historical importance.

Ultraviolet rays are the agent by which these palimpsests are deciphered, and they are generated by a lamp of the familiar mercury vapor type. In this instrument, a direct current of electricity is passed through the vapor of molten mercury contained in a quartz generator, and electrons in the form of ultraviolet energy are driven off similarly to x-rays. The burner is housed in a box-like structure with suitable arrangements for observation and insertion of the camera lens, and all rays emitted by the lamp other than the ultraviolet are screened from the subject examined, by the provision of a special filter, which is permeable to this group only. Consequently, the manuscript is illuminated by a beam of invisible ultraviolet rays only. In some lamps a solution of copper-sulphate and a deep orange dye, nitrosodimethylanaline, is used to make the filter, and this is contained between sheets of uviol blue glass, but in the Hanovia apparatus, one of the most widely used, this type of filter has been superseded entirely by a new glass, almost black in color, which transmits the ultraviolet rays only.

When examined beneath these rays, various substances, including many dyes, fluoresce distinctly, and each differing substance exhibits a characteristic color. When a substance capable of fluorescing is excited by filtered ultraviolet these invisible rays are changed into visible light of longer wave-length and a curious glow, to which the term fluorescence is applied, is seen.

When an old manuscript is examined in this way, the tints and dyes left in the parchment from the earlier writings, fluoresce distinctly from those of the visible text and from the parchment itself, and the palimpsest can easily be distinguished. By using a special filter, the later writings may be eliminated and a photograph taken of the earlier script only, but it is of probably greater interest to see the two texts on one print. The visible writings appear as if in outline type, that is, white letters with a narrow black edge, and underneath, or often transversally, may be seen the dark grey

lettering of the original text. Slight imperfections due to the varying action of the cleaning process are to be expected, but it is seldom that any difficulties in deciphering occur, which are due to visibility.

The Codex contains the Gospels in Greek, wanting only John, XIX, 17-35. It is written on 197 vellum leaves, each measuring 8⅞ x 7⅛ in., and is complete with prologues, Eusebian Canons and tables. In all probability this manuscript was written in the monastery of St. Gall in the ninth or tenth century. It is said that the scribe was one who did not know the language, and who had little practice in forming the characters, for the Greek are small semi-uncials of western type, while the Latin are in minuscules of Irish type. Formerly, the Codex Sangallensis contained also the Pauline Epistles, but these are now separate and form the Codex Boenerianus of the Royal Library at Dresden.

It is an extraordinary development of science which thus enables writing erased so long ago to be read again, and while the ability to photograph the fluorescence makes a permanent record ready for immediate reference, testing with ultraviolet rays has the great advantage over other methods using chemicals which might be employed, in that no damage is caused to the existing writings. As it has been possible to photograph a palimpsest on this manuscript, it is probable that attention may ultimately be given to similar writings. The Codex Paulinus at Wurzburg, which contains the thirteen epistles of St. Paul, and the Epistle to the Hebrews, or the Codex Ambrosianus, formerly at Bobbio, now at Milan, may probably yield new matter of much interest. As yet, sufficient work has not been accomplished to complete the translation of the palimpsest, but the investigations will be continued eagerly.—*Antiquity.* (*Brit. Jour. Rad.*)

Roentgenotherapy in Inflammatory Disorders

Professor Milani of Perugia spoke at the third International Congress of Radiology on "Roentgenotherapy in Inflammatory Disorders." The speaker stated that the treatment of areas of inflammation with roentgen rays became, in 1924, through the work of Heidenhain and Fried, a recognized therapeutic method. The technic consists in the early direct irradiation of the focus. The majority of authors advise irradiation with small doses, the optimum being placed at 20 per cent of the erythema dose. An attempt has also been made to influence at a distance an inflammatory lesion with irradiations of the spleen and of the epiphyses of the bones. The greatest advantage of direct roentgenotherapy is derived in localized, acute or subacute, types of inflammation; the chronic infections, and especially the specific types (tuberculosis, syphilis, actinomycosis) give less rapid and less brilliant results. Many trials have been made of indirect roentgenotherapy in malaria, but according to the Italian authors the results have not been very effective. The treatment of pulmonary tuberculosis by means of irradiations of the spleen has not yielded satisfactory results. According to Milani, in typhoid and parathyroid, irradiation with small doses of the epiphyses of the bones cannot be considered as a curative method; but the reaction of the typhoid patient to this treatment may be regarded as a good therapeutic criterion, and sometimes an improvement in the general condition and a shortening of the febrile period are observed.

Four factors may be invoked to explain the action of the local irradiation, namely: modifications of the circulation; action of cellular necrobiosis and absorption of protein; action on phagocytosis, and action on the reticuto-endothelium. — *Jour. A. M. A.*, (Jan. 16), 1932.

Animals Die When Deprived of Rare Gases in the Air

Oxygen and nitrogen, chief constituents of the air, are not alone sufficient to keep life aglow, Prof. J. Willard Hershey of McPherson College, Kansas, has reported to the American Association for the Advancement of Science. His experiments showed that animals die after living ten days to three weeks in air from which carbon dioxide and rare gases, helium, argon, krypton, etc., are removed.

Prof. Hershey predicted that helium atmosphere would be used in fighting diseases just as oxygen atmospheres are now utilized in treating pneumonia. Large factories and office buildings supplied with synthetic atmospheres in which oxygen is mixed with helium instead of nitrogen are also foreseen by Prof. Hershey as a result of his tests. — *Science News Letter,* January 9, 1932.

THE STUDENT'S LIBRARY

PHYSIOTHERAPY: ITS PRINCIPLES AND PRACTICE. By *F. Howard Humphris,* M.D., (Brux.), etc., and *Ralph E. Stuart-Webb,* M.B., B.S. (Lond.), etc., with contributions by *Frank Romer,* M.R.C.S., *A. E. Hayward Pinch,* F.R.C.S., and *A. Gordon Watson.* Cloth. Pp. 399. Price, $4.50. New York: The Macmillan Company, 1932.

There are two distinct divisions of this book, one on principles, the other on practice. Eleven chapters comprise each division, twenty-two chapters in all. Every chapter in the realm of physical therapy is included, commencing with static electricity and concluding with miscellaneous methods. In this latter chapter such subjects as the melted paraffin-wax bath, foam therapy, carbon dioxide snow and vibration are briefly discussed. Chapter VIII, or radium therapy, is contributed by A. E. Hayward Pinch; Chapter IX, on massage and manipulation by Frank Romer; and Chapter X, on spa treatment, by A. Gordon Watson.

The introduction is quite lengthy. In it the author attempts to define physiotherapy, to give its scope in a general way, and to classify the effects of the various agents and tell how they are produced. The author states: "It is not intended that the scope of this book should include either a history of physiotherapeutic measures, or an inventory of all the many ways in which it is possible to use them in disease; the purpose rather being to discriminate and explain the class of ailment which is pre-eminently suitable for these valuable agencies; to note those diseases in which physiotherapy may be found useful, to give some idea of the apparatus employed — and, in some cases, how such apparatus is made."

The subject of dosage is stressed. Thus in the introduction Humphris writes: "Early in my medical career, I was taught that the dose of a remedy is that which will produce its therapeutic effect. This, though then referring to pharmaceutical products, is equally true of physiotherapeutic remedies." The matter of dosage is again carefully detailed in the chapter on ultraviolet rays. While unable to give specific rules for dosage, an effort is made to generalize in such a way that the student has a suitable guide for his work.

Static, x-ray and radium therapy, subjects not usually included in books on physical methods, receive sufficiently adequate attention to be informative and instructive. Static is not commonly employed, while radium and x-ray are usually administered by specialists in these fields. The low voltage and high voltage currents receive ample treatise. Massage and manipulation, now considered important phases of physical treatment are discussed and their principles stated, and the same applies to spa treatment.

The chapters on practice are based on the respective systems of the body. Chapter XII is on the diseases of the alimentary system. The more important diseases amenable to physical procedures are detailed. Technics are sometimes briefly given, sometimes more fully.

Chapter XIII deals with diseases of the circulatory system. Here blood pressure, angina pectoris and myocardial weakness and degeneration are the predominating subjects. Chapter XIV, on diseases of the respiratory system, covers some of the commoner diseases with which the practitioner comes in contact frequently. It cannot be said, however, that the enthusiasm for the treatment of the common cold and for hay fever is shared by those who have employed physical methods on a large scale during the past decade. While high frequency current and ultraviolet are valuable adjuvants and helpful in many instances they are far from being specific remedies. Experience has demonstrated that they cannot be depended upon to the exclusion of other treatment.

Anterior poliomyelitis is included in Chapter XV. Progress has been made in the management of infantile paralysis and physical therapy has played no little part in this. It is questionable whether neurasthenia merits as much space as the author devotes to it.

It is well recognized that physical methods have played a significant rôle in the treatment of diseases of the joints, of fibrous tissue and muscles. This chapter is therefore too meager for the relative importance of these subjects. The same observation is made in reference to diseases of the organs of special sense.

Gynecology, dermatology and diseases of a miscellaneous nature occupy the concluding section of the book. The available references for these discussions are such that the author has had ample material to draw from. These chapters are, therefore, well detailed. A glossary and an index consume the final 60 pages.

It must be said that the book represents a determined effort to include in it adequate information for the student and for the general practitioner. The arrangement of the material and the division into discussions on principles and practice are departures from the schemes of other authors. The subject of physical therapy has broadened very materially during the past decade. Newer technics are constantly being exploited. Some are included while others have for some reasons been omitted. While it is fully appreciated that in 400 pages one is limited in the text material which can be included, some of the more recent developments in the field, for example, therapeutic fever by diathermy merits a separate section in a book which so recently comes from the press. No doubt, the author will take cognizance of this for future editions. In spite of this and other suggestions which can be made, this volume is a valuable addition to any medical library.

THE FACTOR OF INFECTION IN THE RHEUMATIC STATE. By *Alvin F. Colburn,* M.D., Resident Physician of the Presbyterian Hospital in the City of New York. Cloth. Pp. 288 with 7 color plates and 37 illustrations. Price $6.00. Baltimore: The Williams & Wilkins Company, 1931.

This monograph represents as scholarly an evaluation of the present convictions and current knowledge regarding the rheumatic state as has become acceptable to the highest centers of contemporary teaching. "The purpose of this study," explains the author, "is to give a comprehensive description of the rheumatic state with its many phases" . . . The term "rheumatic state" is used by the author in preference to "acute articular rheumatism" because of its greater flexibility to include "that great mosaic of disease manifestations which in the past has been described under the" latter title. There is today still a definite confusion regarding this malady and its manifestations, and much of the value of this contribution lies in the fact that an attempt has been made to bring to focus a clear picture of its action as well as the influences that tend to produce it in men.

Undoubtedly many factors are at work in the maturation of the rheumatic state in man and most frequently, according to the author, the causes commonly provocative are susceptibility, age, environment and infection. Each of these respective factors has here been meticulously evaluated and has led to the conclusion that upper respiratory infection plays a greater rôle in the production of the rheumatic state than is ordinarily appreciated. This, however, must not be interpreted that the work is wholly devoted to the single idea that upper respiratory infection is the specific factor in the development of the arthritic state. On the contrary, the foregoing exposition has sounded a more universal and scholarly note regarding the many phased nature of this malady than most books on the subject. What the author calls particular attention to is that observations have led him to the conclusion that the common factor in all these cases is an existence of a special type of tissue response, the production of "chemical substances," that, in the presence of upper respiratory infection, asserts itself in the form of various rheumatic manifestations. In order to verify this growing opinion, more than fifty thousand bacteriological examinations were made from a number of groups of individuals. "These have included," states the author, "subjects without evidence of disease, others with respiratory infection, others stigmatized with the rheumatic state and many with an active rheumatic process. The examinations have included cultures of the pharyngeal flora and cultures from within the tonsils, from the accessory nasal sinuses and respiratory passages." The most common organism recovered in these studies was the *streptococcus hemolyticus.* It became apparent that wherever susceptibility was mixed with this organism, in a climate other than sub-tropical, the individual usually developed some form of rheumatism.

The entire thesis has been impressively presented by a most convincing array of case and necropsy reports, tables, charts, figures, colored and black and white half tones, and concluded by a comprehensive bibliography. The final conclusion arrived by the author is that "rheumatic processes are a human reaction, which appears in susceptible individuals, and which represents a special type of tissue response to chemical substances arising from diseases of the upper respiratory tract."

In evaluating this contribution it is difficult to hold back the superlatives that crowd to one's pen. It is our opinion that it is by far the most scholarly discussion on the etiology of the rheumatic state that has been contributed in recent years. We recommend it to the profession as a book essential to all progressive practitioners of medicine.

THE HARVEY LECTURES, Delivered Under the Auspices of The Harvey Society of New York, 1929-1930, Series XXV, Under the Patronage of the New York Academy of Medicine. By *Dr. Ernst P. Pick, Dr. E. K. Marshall, Jr., Dr. E. W. Goodpasture, Dr. Alan M. Chesney, Dr. Philip E. Smith, Dr. Esmond R. Long, Dr. W. J. V. Osterhout, Dr. Rufus Cole, Dr. Graham Lusk.* Cloth. Pp. 225 with illustrations. Price $4.00. Baltimore: The Williams and Wilkins Company. 1931.

The Harvey lecture series have occupied an unusual place in contemporary medicine in America because of their unique position in presenting the topics of leading interest in the field of medical science. The present volume is the twenty-fifth in the series of collected addresses from the pen of the most distinguished group of scientists. It introduces the reader to what may perhaps be considered the most advanced concepts in the respective fields associated with the names of these collaborators. Although the contents of this volume is limited to nine essays, they undoubtedly represent the most authoritative opinions on the subject. They include such a varied field of investigation as, "The Regulation of Water Metabolism" . . . "The Cardiac Output in Man" . . . "Etiological Problems in the Study of Filterable Virus Disease" . . . "Acquired Immunity in Syphilis" . . . "Relations of the Activity of the Pituitary and Thyroid Glands" . . . "The Chemical View of the Pathogenesis of Tuberculosis" . . . "The Electrical Phenomena in the Living Cell" . . . "Progress of Medicine During the Past Twenty-five Years as Exemplified by the Harvey Society Lectures," "The Harvey Society."

It is difficult to dwell on any particular section without feeling that perhaps other parts are equally as intriguing. Cole's "Progress of Medicine," and Osterhout's interpretation of the "Electrical Phenomena in the Living Cell," are the chapters that have left the most pleasing personal impressions. They fulfill one's appetite for scientific and philosophical interpretation of subjects so apparently disconnected and yet so vital and appealing to our intellectual hunger. The contents of this book are both stimulating and thought-provoking, and to paraphrase the words of Profesor Whitehead, it may be said that the value of this book is not in its bulk but rather in the ideas it contains.

It is recommended to all those who relish an intellectual excursion of highest order.

THE QUANTUM THEORY. By *Fritz Reiche,* Principal of Physics at the University of Breslau, Translated by *H. S. Hatfield,* B.Sc., Ph.D., and *Henry L. Brose,* M.A., Revised edition. Cloth. Pp. 218 with fifteen diagrams. Price, $2.10. New York: E. P. Dutton and Company, Inc., 1931.

That insignificant causes may foreshadow remarkable effects is a truism well illustrated in connection with the development of that mathematical concept — the quantum theory, in things pertaining to our physical environment. As the author well points out, "Out of the well known Michelson-Morley Experiment, which, in spite of the application of the most powerful methods of exact optical measurements, failed to show an influence of the earth's movement on the propagation of light as was predicted by classical theory, there arose the great structure of Einstein's Theory of Relativity. In the same way the trifling difference between the measured and calculated values of black-body radiation gave rise to the Quantum Theory which, formulated by Max Planck, in 1900, was destined to revolutionize in the course of time all departments of physics."

The present work is both an appraisal and a fascinating review of the life history of the quantum theory to the present time. The author has dipped deeply into its historical development and has managed to present an interesting picture of its general growth, its extension in new directions and its possible ramifications. Touching at random throughout its contents, it is noted that critical attention has been devoted to a discussion of its relationship (its rise and offspring) to black-body radiation — to the work of Stefan-Boltzmann, Wien, and the respective laws of radiation and displacement that their contributions gave rise to. The applicability of the theory is then brought into the general field of radiation, into the molecular theory of solid bodies, gases and roentgen spectra. It touches such diversified discussions as the Einstein photo-electric effect and light-quanta, the transformation of electronic energy into light-quanta, the limitation of Bohr's theory, the contributions of Mosely, Bragg, Rutherford, Thompson, Millikan, Sommerfeld, Schroedinger, Compton and other notable scientists.

Because of the wealth of speculation and innumerable side theories that have been constantly added to the quantum theory, as originally enunciated by Planck, it has become the most involved and formidable philosophico-mathematical speculation of modern times. The present work is an attempt to give in broad outline the most important features of the doctrine of quanta, its origin, development and its ramifications. "If," suggests the author, "we survey the whole structure as it stands before us, from its foundation to its highest story, we cannot avoid a feeling of admiration; admiration for the few who clear-sightedly recognized the necessity for the new doctrine and fought against tradition, thus laying the foundation for the astonishing success which has sprung from the quantum theory in so short a time." However, in spite of its bold and brilliant formulation, the doctrine still offers no explanation nor brings us nearer to a better understanding regarding the heart of matter. Although it appears rational to accept that "there are discrete mechanical and electrical systems, characterized by quantum conditions and marked out from the infinite continuity of 'classically' possible states," we must still ask the question, where does the deeper cause lie, which brings about this discontinuity of Nature? There hovers at present over this problem a cloud of obscurity that is as mystifying as it is fascinating. In consolation of the present difficulty the author states, "In spite of the enormous empirical and theoretical material which lies before us, the flame of thought which shall illumine the obscurity is still wanting. Let us hope that the day is not far distant when the mighty labors of our generation will be brought to a successful conclusion."

The book is an extraordinarily clear exposition of the most fascinating and important branch of modern physics. By means of notes and a rich bibliography the reading of this book will assure a better understanding of this important but abstruse study. The work is highly recommended both because of its brilliant exposition and its authentic analysis of the many contributions to the subject.

ERGEBNISSE DER GESAMTEN TUBERKULOSE. Forschung. By *H. Assmann,* Konigsberg I., Pr. *H. Beitzke,* Graz, *H. Braeuning,* Hohenkrug-Stettin, *St. Engel,* Dortmund. Band III. Cloth. Pp. 695 with 143 illustrations. Price, 59.60 marks. Leipzig: Georg Thieme. 1931.

Eight mongraphs are included in this excellent volume, the third of a set of three written under the editorial supervision of the above named group, who are leaders in the specialized field of tuberculosis in Germany. The collaborators to this volume have presented their subject matter painstakingly well. There are an abundance of case reports to illustrate the discussion on the various phases of tuberculosis considered. The literature, especially that of German investigators, has been carefully included and the bibliographies are very complete. The monographs include Pathological, Anatomy of Pulmonary Tuberculosis during Adolescence, The Clinical Manifestations of Pulmonary Tuberculosis During Adolescence, Heredity and the Constitution as They Effect the Tuberculous, Tuberculosis and Pregnancy, Primary Peritoneal Tuberculosis in Childhood, Dust Lungs and Tuberculosis, The General Treatment of Tuberculosis and the Public Health Aspects of the Tuberculosis Problem in Germany, with recommendations for attacking this phase of the problem.

To those interested in physical therapy, there are very clear expositions in the monograph on Treatment of Mechano- and Electro-Therapeutic Procedures. Heliotherapy is given a very lucid description, particularly in its bio-physical effects. Roentgen therapy also finds a place in this excellent monograph by Georg Schröder. It is superfluous to say that the publisher's art always is seen at its best in a publication by Thieme.

INTERNATIONAL ABSTRACTS

Actinic Ray Therapy of Malignant Neoplasms of Tongue and Jaw. A. Cieszynski and E. Meisels.

Polska Gazeta Lekarska, **10:***983 (December 20).*

Cieszynski and Meisels are of the opinion that roetgen treatment of tongue and jaw cancer is almost useless or, at best, its action results in amelioration of the subjective symptoms at the price of injury to surrounding structures. Moreover, direct irradiation by aid of localizers is uncomfortable to the patient, while it is doubtful whether it is of any more benefit than irradiation through the cheeks and neck. The failure of roentgen rays, they reason, is due to reduction in radioconductivity of tumor tissue, and serious injury to surrounding tissue will result before the neoplasm will suffer at all. Radium is their agent of choice, applied to the surface or by radiopuncture. In surface application the holders of Stents or the authors are suggested to hold a 0.5 mm. platinum tube containing radium salts in place. The doses are usually high. Radiopuncture is far superior. Platinum-iridium needles from 15 to 20 mm. long are introduced, under local anesthesia, into tumor tissue in the proportion of 1 mg. of radium to each cubic centimeter of tumor tissue. This treatment is most advisable in cancers of the frontal half of the tongue and mucous membrane of the cheeks; in the posterior part the combined treatment (surface and radiopuncture) gives better results. Surgical treatment should be resorted to in early cases that do not require extensive mutilation, also cases refractory to actinic therapy in which the necrotic tissue annihilates the radioconductivity. The primary lesions respond to this treatment if handled correctly. The metastases, however, usually early and abundant in cancer about the mouth, present a different problem; surgery is the only method of treatment.—*Jour. A. M. A.* (March 5) 1932.

Ray Therapy of Exophthalmic Goitre. J. Prüfer.

Münch Med. Wochensch., **78:***2187 (December 25) 1931.*

Prüfer gives the clinical histories of six patients who died in a coma following roentgen irradiation of an exophthalmic goiter. But although he assumes a relationship between the irradiation and the fatal comas, he also reports that in six other cases of exophthalmic goiter the results of roentgen therapy were favorable and that five other patients, who had not been subjected to irradiation, also died in a comatose condition. He does not wish to assert that in the six reported cases the irradiation was always the cause of the coma, but he thinks that it led to the manifestation or only exacerbated an already existing coma. From his observations the author concludes that greater discrimination is necessary in the selection of patients for roentgen therapy, and that patients with beginning coma should be excluded from irradiation. However, he does not wish to discredit roentgen treatment of exophthalmic goiter but only wishes to call attention to possible injurious effects.—*Jour. A. M. A.* (March 5) 1931.

Fever Therapy in Congenital Syphilis. G. Soeken.

Arch. f. Kinderh., **92:***216 (Feb. 13) 1931.*

The author used fever therapy in thirty-five cases of resistant syphilis. In nine cases the fever agent was blood from patients with recurrent malaria, and in twenty-six cases, blood from patients with tertiary malaria. The dose was from 2 to 5 cc. of blood. The height of the action was six days for the recurrent form, and from four to twenty days for the tertiary. The results were as follows: Of six children with syphilis of the central nervous system, four were clinically improved and five showed serologic clearing. Of seven with bad neurologic symptoms and positive Wassermann reactions, four were clinically improved and six had negative Wassermann reactions. One child who had a return of symptoms was unchanged. Of five children with positive Wassermann reactions three became negative, and of twelve Wassermann-fast cases seven showed improvement.—(*Arch. Derm. and Syph. (Feb.) 1932.*)

X-Ray Therapy of Whooping Cough. E. S. Bucher, M.D.

Clin. Med. and Surg., **39:***118 (Feb.) 1932.*

The pathology and physiology of whooping cough are considered. Various aspects of x-ray treatment are detailed and case reports given. The author's conclusions are:

1. Irradiation reduces the affected lymph glands and the thickened bronchial tree in whooping cough.

2. Vomiting is entirely stopped or greatly reduced, thereby permitting the ingestion of nourishment and the prevention of acidosis.

3. The severity and number of paroxysms are reduced 75 per cent or more in a very large percentage of the cases.

4. The administration of alkalies, calcium, antispasmodics and sedatives is indicated, in conjunction with x-ray therapy, where the patients fail to respond promptly.

5. The dosage should be carefully measured, the wave-length and "r" unit methods being preferable.

6. Not more than two exposures, as outlined, should be given over one area.

Prostatic Massage. L. von Heiner, Dermatological Univ. Clinic, Szeged.

Wochenschr., No. 16, 1931.

Prostatic massage is the most important type of treatment of gonorrheal prostatitis after the acute symptoms have run their course. It therefore caused a good deal of excitement when *Stutzin*, in 1926, took an energetic position against prostatic massage as a harmful and unnatural measure (»Ars. Medici«, 1926, p. 450). There had been previously several opponents of prostatic massage, but the work of *Stutzin* stimulated a lively literary discussion between the opponents and the numerous proponents of this type of treatment. The opponents brought up the following to support their contentions: the prostate consists of straight tubulo-alveolar glands so that massage presses in the diseased secretion. We cannot exclude, even in apparently chronic prostatis, acute foci in the gland, from which the pus can be driven into the blood and lymph vessels through the massage. The prostatic massage contradicts our usual therapeutic principles of rest for diseased organs, and the possible surgical evacuation of existing pus; we do not, for that matter, massage a mastitis, although here we can more surely differentiate between the chronic and acute forms through the sense of touch. In contrast to these views, the proponents of prostatic massage emphasize the fact that only gonorrheal prostatis (which makes up 90% of all prostatis) is massaged; gonococcus, however cannot be compared to the pus producers (as, for example, in the breast). The gonorrheal inflammation in the tubules is no abscess, nor even a pre-stage of one. When the pathologically changed secretion stagnates in the secretory ducts, these become blocked, the lumina of the glands dilated, and healing prevented. Abscesses arise only in mixed infections; these are not hard to recognize and are naturally not massaged. The practical improvement of prostatitis through massage is striking; usually the urine quickly becomes clear. To clear up this question, the author has treated 58 out of 116 cases of prostatitis with the usual massage and 58 exclusively with diathermy and faradisation. He was fairly successful in apportioning to each of these groups an equal number of mild and severe cases; in the group of cases treated by massage, the number of severe cases was slightly larger. The result was that the cases treated without massage needed, on the average, a much longer time for cure, and that, in these cases, complications and relapses were also much more frequent. The author, therefore, holds to prostatic massage as the best method of cure known up to the present. — *Ars. Medici*, Vienna.

The Diagnosis of the Obstruction of Coronary Arteries by Means of Electrocardiogram. Dr. S. von Pinterkovats, 2nd Med. Univ. Clinic, Budapest.

Medizinische Klinik, No. 26, 1931.

Only in rare cases can it be recognized in the living subject. Pain localized in the abdomen and collapse have often erroneously led to laparotomy which was not indicated. An electrocardiogram throws light on the question. Arteriosclerotic affection of the wall of a coronary vessel, syphilis or embolism may any of them be regarded as the cause of the obstruction. A sudden pain in the chest accompanied by dyspnoea is an important symptom of the disease. Nothing but an electrocardiogram makes it possible to establish an absolutely certain diagnosis. The confluence of the R and T deflection and the abnormal height of the T deflection speak for an acute stage. If the apex of the heart contracts only feebly or not at all, the T deflection is higher and corresponds with the R deflection. Typical features in the further course of the disease are the small R deflections on a broad basis with the characteristic signs of the preponderance of the left side of the heart which had probably developed before the obstruction occurred and the fact that the T deflections are negative in two or three sections.

Radiation Therapy in Treatment of Cancer of Mouth and Lips. J. M. Martin.

Radiology, **16**:881 (June) 1931.

Martin believes that cancer of the mouth and of the lower lip in the early stages does not frequently metastasize. For clinical convenience, all cases of cancer of the lower lip are roughly classified under three stages. In the first stage are grouped all cases in which the lesions are confined to the superficial tissues; that is, to the mucocutaneous structures proper. The second stage includes all lesions that have become more extensive, with the induration and ulceration more pronounced and the subcutaneous structures involved without evidence of invasion of the lymph nodes. In the third stage are included all cases in which the lesions are extensive and in which the lymph nodes show unmistakable evidence of metastasis. In 119 cases of cancer of the lower lip treated by roentgen rays, 86 were in the first, 22 in the second and 11 in the third stage. In the first and second stages there were 108 patients who did not show evidence of metastases at the time of treatment. Later, 4 patients developed malignant nodes in the neck, and died. The remaining 104 patients (or 96.3 per cent of the patients in the first and second stages) were well after five years. The 11 patients in the third stage had definite lymph node involvement at the time treatment was begun. All the patients in this stage died of cancer. It is the author's experience that early malignant lesions inside the mouth respond remarkably well to small amounts of radium in platinum needles implanted in the tissues. Interstitial radiation inside the mouth is augmented by highly filtered radium packs and roentgen rays applied externally. Oral hygiene is an important factor in the successful conduct of this class of cases. In incurable cancer of the mouth and lips, the patient can often be greatly benefited by radiation therapy, while in some cases life can be prolonged for months. — *Arch. Derm. & Syph.*, (December) 1931.

Xanthelasma Treated with Thorium X: Case Reports. W. Meerhoff.

Klin. Monatsbl. f. Augenh., **85**::661 (Nov.) 28, 1930.

Operative removal of xanthelasmas does not prevent recurrences, nor is it practical in cases with multiple lesions. As the use of roentgen rays and radium is too risky for the eye, Loehlein experimented with ray treatments of thorium X and with an ointment and also an aqueous solution of thorium X. The solution must be freshly prepared in each instance, because the activity of the alpha rays is at its height twenty hours after preparation, sinks rapidly afterward and is exhausted after two weeks.

Meerhoff reports six cases in which the patients were treated at Loehlein's clinic by placing small pieces of one layer of gauze, the size of the xanthelasmas, over these formations and by moistening them with the solution from four to five times. The treatment was continued until a cutaneous reaction appeared. The doses administered could be figured out, since the quantity of "es-E" (Emanations Einheiten or emanation units) contained in each cubic centimeter of the solution was known. Most of the xanthelasmas disappeared completely, while some of them remained visible in the form of faint yellow spots. The treatment with thorium in any form, including the aqueous solution, will not prevent recurrences in some cases. It is recommended, however, on account of its simplicity, painlessness and lack of risk. Large doses have not been used up to this time.—*Arch. Derm. & Syph.*, (December) 1931.

Therapeutic Fever Produced by Diathermy in General Paralysis and Tabes Dorsalis. William C. Menninger, M.D., and Ralph M. Fellows, M.D.

The J. of the Kansas M.S., **32**:369, (Nov.) 1931.

The authors discussed the disadvantages of malarial treatment. They detail the method of producing therapeutic fever by diathermy and speak of its advantages. Because of a brief experience, no statement of opinion is ventured, but their own results are given. They are trying to evaluate diathermy fever treatment for other conditions. Summarizing their report, the authors state:

1. The production of a therapeutic fever by diathermy for treatment of general paralysis and tabes dorsalis seems to be the most safe, effective measure for the treatment of these conditions.

2. Its advantages lie in the ability to control the degree of fever, the time of treatment, the opportunity to combine medicinal treatment (arsenic and mercury) with it, and apparently a minimum amount of complications and low mortality.

3. It is also reported to be of value in asthma and corea and probably would be as effective as any agent yet known in the treatment of multiple sclerosis.

Injuries of the Back Resulting from Aquatic Sports. Dr. H. Schulze, Stettin.

Arch. f. orthopäd. u. Unfallschirurg., **30**:1, 1931

Injuries of the abdominal walls, viscera, or cervical vertebra can result from high diving. The author describes two new forms of injuries resulting from the above; fracture of the lumbar transverse vertebral process, and a tear of the long dorsal muscle. The divers sustained these injuries because of their attempting to change their original form during the dive. In the moment of the take-off, they believed that they would not hit the water correctly and therefore attempted quickly to change from what they thought an oblique or horizonal position to the desired one, while in the air, or immediately before they hit the water. The accident occurred in several cases through such a sudden movement. The immediately ensuing manifestations consisted of violent pains in the back, in case of a fracture, also of congested pains in the lumbar vertebrae, also pain connected with any movements of the trunk. The roentgen examination in the latter case showed a fracture of the fifth lumbar transverse vertebral process. A cure was effected within four weeks through careful attention, lying on the stomach, and the application of warmth. In two other cases, a tear in the long dorsal muscles occurred, which happened to be in strong active tension at the take-off of the dive, and became ruptured through the above mentioned sudden change of position. The symptoms were: pains in changing from a bent to an upright position, pressure pain and slight swelling of the lower vertebral region, also extreme pain in sideward flexing of the trunk. The physiological lordosis failed in one case, the region was flat, the thoracic vertebrae were kyphotic. The roentgen examination in two such cases showed that no bone fracture or injury had been sustained. Recovery was effected within four to six weeks through the application of warmth and massage.

Report of a Stubborn Case of Actinomycosis Cleared Up by Electro-coagulation. Lewis J. Silvers.

N. Y. State Jour. Med., (September 15) 1931.

The diagnosis of actinomycosis had been made while the patient was under treatment at the Morrisania Hospital, the examination revealing a typical case of mycosis leptothrica of a most persistent strain. The base of each protruding white stem-like growth was touched by the active needle electrode of the bi-terminal endothermy current. The growth was so abundant and involved so extensive an area that twelve mild doses of electro-coagulation were necessary. The maximum current used was four hundred milliamperes. Fulguration was used in the terminal stages, since the dehydration process is always beneficial in hastening the results of coagulation. At no time did any of the parasitic lesions recur following the coagulation dose. The time required for total cure depended upon two factors, namely: the mildness of the dose and the number of bulbous growths to tbe treated. Complete destruction of the fungus infestation was accomplished in six weeks.

Physical Treatment of Mental Illness. John A. Holland.

New Eng. J. of Med., (Aug.) 1931.

Physical agents to be of value must be combined with other measures as indicated. The agents used are diathermy, sine wave, actinic ray and colonic irrigations. Diathermy is indicated because intestinal stasis is largely responsible for mental symptoms and is caused by adhesions. Patients who do not respond to this procedure, must be operated upon and then the procedure repeated as soon as possible, usually after three or four days. In addition to softening adhesions, general heating of the intestinal tract stimulates metabolism by increasing the blood supply in the abdominal organs and inhibits the growth of pathological bacteria. While diathermy is being used, the sine wave and colonic irrigations are used concurrently (alternately).

Ultraviolet radiation is quite useful for its metabolic effect and whole body exposures are generally used. The carbon arc is preferable to the air-cooled quartz light because of the better results. During the summer months, artificial light is best replaced by sunlight. Plain warm and cool tap water accomplish the best results.

The above described form of treatment is confined to purely psychotic conditions and must not be used in the presence of the generally accepted contraindications.

Wound Tetanus—Damp Packs of the Entire Body. Doctor J. Woroschilsky, Odessa.

Therap. der Gegenwart, No. 8, 1931.

The author describes a typical case of tetanus traumaticus which was treated with damp packs over the entire body (five times daily for a period of two hours — together with luke-warm vinegar sponges and cool head compresses), and fully recovered after six weeks of this treatment. In the fifth week, after a decided improvement had set in, the packs were applied only three times daily for an hour at a time. The linen cloth was moistened with a decoction of ordinary hay, and the legs were kept warm with hot water bottles and woolen blankets.—(*Ars. Medici*, Vienna.)

Disturbances of Circulation in the Legs. Dr. A. W. Allen, Massachusetts Genl. Hosp., Boston.

New England Journal of Med., No. 17, 1931.

In cases of intermittent claudication, Raynaud's disease, etc., Bürger's exercises have often produced excellent results; legs raised to an angle of 45° until the feet are blanched (about two minutes), then the legs hanging down until the feet become cyanotic and painful (one to three minutes). This exercise should be repeated 3 to 6 times at a sitting with intervals of five minutes during which the patient must lie absolutely still with his legs warmly wrapped up; the sitting should be repeated two to four times daily. In addition slight gymnastic exercises for the legs.

A New Electrode for Ionophoresis of the Prostate and Seminal Vesicles. Beirach.

Dermatologische Zeitschrift, (November).

The author describes a new electrode for the application of ionization in the treatment of the prostate gland. This is a rectal electrode so curved as to bring it up in contact with the prostate, and, in addition to an electrical attachment, it has two canals, one for the entrance and the other for the exit of fluid. The medicament which he employs in all cases is a 1 per cent solution of potassium iodide. The indifferent electrode is placed over the pubis and after some of the iodide solution has flowed into the rectum the current is turned on. He employs from 20 to 30 milliamperes or in some cases 40 to 50. The duration of treatment is from 20 to 45 minutes. The cathode is placed in the rectum and the anode over the pubis.

Treatment by ionization has long been employed in the profession, but we hear less of it from American authors than from Europeans. It is, of course, an established fact that the tissues can be made to take up certain medicaments by this method much more rapidly and completely than is the case when simple absorption is relied upon. — *Uro. & Cut. Rev.*, Feb., 1932.

Roentgen-ray Treatment in Acne Vulgaris. L. W. Lord and J. E. Kemp.

Southern M. J., **24**:867 (Oct.) 1931.

These writers report 247 cases of acne vulgaris treated with the x-rays. This treatment consisted in weekly exposure to one-quarter skin unit of unfiltered x-rays. An astringent lotion containing sulphur precipitate, powdered camphor and powdered tragacanth in lime water was used. If an erythema with a feeling of dryness of the skin developed, as occurred in some cases after the fourth or fifth x-ray treatment, the use of the lotion was stopped for a week, and it was then employed at longer intervals. Also if this erythema occurred, or any sign of ephilide formation, two layers of chamois were interposed between the patient's face and the x-ray tube. In this way no ill effect of the treatment was noted in any case. A follow up of the 247 cases showed that 184, or 74.5 per cent., reported a complete cure or marked improvement. Sixty-three reported a relapse; in 31 the relapse was mild and in 32 it was severe, but not always of so great a degree as in the first attack. In these 63 cases, further x-ray treatment was given in only 12 instances, other methods being employed in the majority. In 124 cases a carefuly prescribed diet was followed, and in 123 cases diet was not prescribed or was not followed. The percentage of cures was definitely higher in those with dietetic treatment than in those without such treatment. In this series of cases, treatment was stopped when the lesions of acne cleared up; in this way the number of treatments varied from five to eighteen; it was found that the lower the dosage of x-rays required to clear the condition, the greater the chance the patient had of being permanently cured. This finding indicates that prophylactic x-ray treatments following relief of symptoms are not desirable.

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Of Archives of Physical Therapy, X-Ray, Radium published Monthly at Chicago, Ill., for April 1, 1932.

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County of Cook. }

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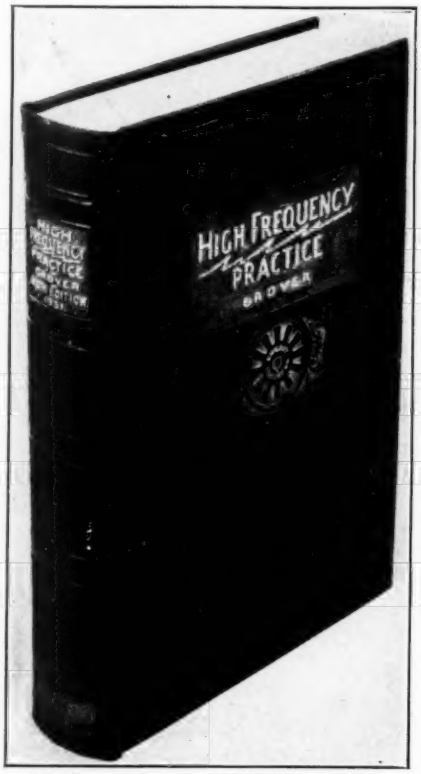

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